COOTES PARADISE STUDY 1986

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by

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SUMMARY & CONCLUSIONS

In 1976 the Ontario Ministry of the Environment published "A Water Quality Study of Cootes Paradise" which assessed the effects of the discharge from the Dundas Water Pollution Control Plant (WPCP) to Cootes Paradise. The report recommended:

1. upgrading the quality of the WPCP effluent "to reduce phosphorus to make it limiting to phytoplankton growths";

2. dredging of the sediments from the Desjardins Canal;

3. consideration of installation of an aeration system in the Desjardins Canal upstream from Olympic Drive;

4. relocation of the WPCP discharge to the extreme west end of the Desjardins Canal; and

5. further monitoring of inputs of contaminants from the surrounding watercourses.

The above recommendations were implemented and a second water quality study was initiated in 1979, which is documented in this report.

By 1979 and 1980, there were distinct improvements in water quality conditions in Cootes Paradise following expansion of the Dundas Water Pollution Control Plant when compared to conditions measured in 1975. The greatest improvements were observed in the more westerly portions of the Paradise, west of the inflow of Spencer Creek.

Perhaps the most noteworthy improvement was with respect to total phosphorus. The mean concentration in water reaching West Pond had been reduced by about 90% compared to 1975 values. The major reduction in primary production as indicated by chlorophyll a concentrations in West Pond was a result of these lower nutrient levels. Where nitrogen had prevailed as the limiting nutrient in 1975, the improved nitrification and phosphorus removal at the Dundas Water Pollution Control Plant have resulted in an apparent shift toward phosphorus limitation. Phosphorus levels in the open water portion of the Paradise were reduced approximately 50% in 1979 and 1980 compared to 1975.

Wind mixing and other natural factors in the open water areas maintain rather elevated levels of suspended solids throughout much of Cootes Paradise although there were reductions in the WPCP discharge.

Biochemical oxygen demand was reduced by as much as 75% in the Desjardins Canal by 1980. As with most other parameters,

reductions were greatest in the west end but reductions of 35% to 50% were the rule even in the open waters of Cootes Paradise.

Zinc and copper levels in water were reduced in 1979 and 1980, apparently in response to sediment dredging in the Desjardins Canal. Other metals were relatively stable. On the other hand, dredging was effective in achieving 50% to 85% reductions in most of the metals in sediment at CP7 and CP8 while manganese, iron and aluminum all increased somewhat.

The benthic invertebrate community exhibited moderate improvement. The exclusive dominance of midge larvae and sludge worms was broken somewhat by the establishment of several more sensitive taxa. Factors limiting the variety and distribution of the benthos include sediment toxicity, lack of suitable substrate in many areas, sediment anaerobism and the relative absence of rooted aquatic plants as both substrate and food base.

1979 and 1980 loadings to Cootes Paradise at Olympic Drive were already excessive for suspended solids, and scaled up to design flows at the measured concentrations, the Biochemical Oxygen Demand (BOD), Total Kjeldahl Nitrogen (TKN) and Total Phosphorus limits on the existing Certificate of Approval will be exceeded. Obviously, improved operation of the WPCP will be essential as the hydraulic capacity is realized. Immediate attention should be given to curtailing suspended solids discharged at Olympic Drive as siltation and infilling of Cootes Paradise are considered among the key threats to the continued existence of this wetland ecosystem.

One aspect of this study addressed winter conditions but demonstrated no substantial impact of the winter discharge of elevated TKN and ammonia levels.

Provincial Water Quality Objectives for both phosphorus and un-ionized ammonia were exceeded throughout most of the Paradise, particularly in western areas most affected by the WPCP. Relaxation of the loading limits for total phosphorus, suspended solids and summertime TKN are therefore not considered appropriate. Alternative operating strategies or treatment technologies should be considered. With the Dundas WPCP already approaching the practical limits of conventional sewage treatment technology, it would be worthwhile to consider corresponding reductions in loadings from other sources in the Cootes Paradise basin, such as erosion and urban drainage.

RECOMMENDATIONS

It is recommended that:

- The loading limit on total Kjeldahl nitrogen be revised as follows:

  - May 1 to October 31 - limit 80 lbs/day or 36 kg/day

  - November 1 to April 30 - remove the requirement for nitrification but operate the WPCP in order to produce the best achievable removal of total Kjeldahl nitrogen

- The effluent quality of the Dundas Water Pollution Control Plant be improved with respect to suspended solid loadings in order to meet existing Certificate of Approval limits.

- The remaining loading limits in the existing Certificate of Approval be maintained.

1. INTRODUCTION:

1.1 Background

In 1977, the Ontario Ministry of the Environment published "A Water Quality Study of Cootes Paradise" dealing with the condition of this marsh relative to its role as the receiving waterbody for the Dundas Water Pollution Control Plant (WPCP). At the time of the study in 1975/76, this plant was hydraulically and organically overloaded and was in need of expansion and upgrading. The report presented much of the historical background and a review of significant upstream land use contributing to the condition of Cootes Paradise. It drew a number of conclusions of the existing impact of the WPCP on Cootes Paradise in comparison to loadings from the various tributary streams. The report went on to make a number of recommendations for reducing the WPCP impact and established discharge limits for Biochemical Oxygen Demand (BOD5), Suspended Solids (SS), Total Kjeldahl Nitrogen (TKN), and Total Phosphorus (Total P) of 200, 200, 80, and 20 lbs/day (91, 91, 36 and 9.1 kg/day), respectively.

The recommendations were implemented and the expanded WPCP came on line in October 1978. Nitrification was to be accomplished by aerating the Desjardins Canal upstream from Olympic Drive. The following year this study was initiated to evaluate any changes in the water quality throughout Cootes Paradise which could be attributed to the plant expansion.

In 1984, the Regional Municipality of Hamilton-Wentworth, which owns and operates the Dundas WPCP, initiated a consultant's study of the performance of the plant under a variety of operating conditions in order to optimize treatment effectiveness while maximizing plant capacity. In support of that study, the Ministry was asked to re-assess the Certificate of Approval loading limits, particularly that for Total Kjeldahl Nitrogen during winter months, to determine whether alteration of those restrictions would be justified.

1.2 Purpose of Study

Specifically this report will:

a) Assess water quality throughout Cootes Paradise with respect to conditions documented in 1975 prior to the expansion of the Dundas WPCP;

b) Assess the suitability of loading limits established by the 1978 Certificate of Approval; and

c) Assess the effects of winter discharges of Total Kjeldahl Nitrogen to Cootes Paradise with respect to Certificate of Approval limitations.

2. METHODS

2.1 Sampling Stations

Sampling points (see Figure 1) were selected to duplicate the original 1975 study with minor alterations as dictated by structural changes within the system and other factors as follows. Due to relocation of the WPCP outfall to the extreme west end of the Desjardins Canal, the relative positions of stations CP9 and CP10 have been reversed. In 1979, station CP10 was at a point in the Canal as close as possible to the submerged WPCP outfall. Station CP9 was located on the downstream side of the gabion partition near the middle of the aerated portion of the Canal and was not functionally comparable to the original station CP9 sampled in 1975. As in 1975, station CP8 was located at Olympic Drive. According to conditions of the Certificate of Approval, this was adopted as the point of compliance monitoring of the WPCP effluent quality. Due to changes in the configuration of the outlet from West Pond, station CP5 was relocated upstream from the confluence with Hopkins Creek in the new channel draining West Pond. Station CP11 was located in the bay near Princess Point at the mouth of Chedoke Creek. In order to coordinate with a parallel study in Hamilton Harbour, station CP1 was relocated under the high level bridge in the outlet to the Harbour. All other stations were located as in 1975 (Figure 1).

2.2 Sample Collection & Analysis

In 1979, these stations were sampled a maximum of nine times depending on water levels, flows, weather conditions, etc., between May 29 and September 18.

In 1980, the same stations were sampled up to 14 times between April 10 and November 4. Hickory, Long Valley and Westdale Brooks plus Chedoke, Spencer, Hopkins and Boathouse Creeks were sampled up to 14 times in the course of the summer.

In 1984, the WPCP discharge was sampled nine times between May 23 and August 14 at Olympic Drive (station CP8).

Through the winter period December 18, 1984 to April 17, 1985, water was sampled five or six times primarily in the western portion of the Paradise but as dictated by ice cover and weather conditions.

In July 1980, sediment cores were collected to the maximum depth of penetration of the sampler (approximately one meter, depending on sediment characteristics) from stations CP1 to CP8 plus CP11. No sampling was undertaken in the aerated section of the Canal, stations CP9 and CP10, to avoid possible damage to the aeration system. Sediment cores were frozen and split on the basis of visual horizontal layering.

Invertebrates were sampled using a 6" x 6" Ekman dredge during May and August, 1979 and May, 1980. A partial survey of selected stations in May, 1977 will be discussed as well.

3. RESULTS

3.1 Water Chemistry

Annual means and standard deviations for all parameters are presented by station number including the tributaries monitored, in Tables 1 to 18. Raw data will be available on request in the Ministry's Hamilton Office, Technical Support Section. The 1984 data from Olympic Drive are presented in Tables 19 and 20 including WPCP flows and calculated loadings. The 1985 winter monitoring results are presented in Table 21.

3.2 Sediment Chemistry

The 1980 sediment core data are presented in Tables 22 to 28. Surface sediment quality will be discussed relative to 1975 data, but data from deeper strata are presented for information only.

3.3 Invertebrate Biology

The taxa lists for benthic invertebrates collected in 1977, 1979 and 1980 are presented in Table 29.

4. DISCUSSION

4.1 Water Chemistry

4.1.1 Nutrients and Productivity

Nitrogen and phosphorus are generally considered the major aquatic nutrient elements, with phosphorus specifically, in most cases, being the parameter which limits plant productivity. During the 1975 survey it was demonstrated that there was such a surplus of phosphorus available in the system, originating from the WPCP and accumulated sediments, especially in the Desjardins Canal, that in fact nitrogen was the limiting nutrient.

Table 30 and Figures 2 to 8 compare the concentrations of total and soluble phosphorus, total Kjeldahl nitrogen, ammonium, total organic nitrogen, nitrite and nitrate present throughout Cootes Paradise. Dramatic reductions are evident through the western half of Cootes Paradise compared to 1975 for each of these parameters except nitrite and nitrate. The latter tended to reach higher levels in more recent years, a reflection of improved nitrification and perhaps a tendency toward phosphorus limitation of plant growth. It should be noted that with the exception of the three most easterly stations in 1979, the mean reduction in total nitrogen for 1979 and 1980 compared to 1975 was 35.6%.

4.1.1.1 Phosphorus

Phosphorus demonstrated the most pronounced improvements (Figures 2 and 3). During 1975, approximately 100 lbs/day of total phosphorus was discharged from the WPCP and a further 20 lbs/day was picked up by contaminant release from sediments before entering West Pond, with mean concentrations in water reaching almost 5 mg/l. Through West Pond to station CP5, approximately 1/3 of that loading was lost to sediment deposition and plant uptake. A further reduction in concentration was experienced by station CP4 as a result of mixing with the more dilute waters of Spencer and Hopkins Creeks. Throughout the open water portion of Cootes Paradise (stations CP3, 2 and 1) the total phosphorus concentration declined through processes of dilution, sedimentation and assimilation (biological utilization).

By contrast, mean total phosphorus concentrations in the WPCP discharge were reduced by 75% to 80% in 1979 and 1980 compared to 1975. Loading values dropped to less than 20 lbs per day from the WPCP. The phosphorus-rich sediments in the Desjardins Canal had been removed in the interim so there was a further reduction in waterborne total phosphorus reaching West Pond with mean concentrations less than 0.5 mg/l: a 90% reduction compared to 1975.

The process of phosphorus mining (solubilization and/or physical resuspension) from sediments, which had occurred in

the Desjardins Canal in 1975 (stations CP7 and CP8), was absent there but had shifted to West Pond in 1979. In that year, the mean total phosphorus concentration more than doubled enroute through West Pond, reaching a peak at CP6 and declining to the east. In 1980 however, that increase through West Pond did not occur, but rather there was a slight decrease which continued to the east. The latter may indicate a significant improvement in conditions in West Pond, with its influence extending eastward into the open waters of the Paradise.

Soluble phosphorus showed a similar if not more pronounced pattern of improvement with time. Where soluble phosphorus had peaked at 3.5 mg/l at CP7 in 1975, it had been reduced by 96% to 0.0134 mg/l in 1980. The relative availability of phosphorus changed significantly as well in the Desjardins Canal and West Pond areas. Whereas 74% and 60% of the total phosphorus in the Desjardins Canal and West Pond, respectively, had been in soluble form in 1975, these proportions had dwindled to 19% and 6% in 1979. These changing proportions will be discussed further in a discussion of nutrient limitation.

4.1.1.2 Nitrogens

Total Kjeldahl nitrogen (TKN) followed a pattern very similar to that of total phosphorus (Figures 2 and 4). In 1975, TKN increased from the discharge to Olympic Drive, reaching a peak mean concentration greater than 17 mg/l. It declined through West Pond with the major decrease between CP5 and CP4, apparently due to diluting inputs from Hopkins and Spencer Creeks.

TKN was reduced by about 75% by 1979/80 at all stations west of CP4. Typically 75 - 90% of the TKN was as total ammonium and even in 1980, the Provincial Water Quality Objective of 0.02 mg/l as un-ionized ammonia was exceeded at all stations west of CP4 (Table 30). Note that the term total ammonium will be used throughout this report in reference to ammonia in both ionized and un-ionized forms.

In all three years of study, the organic component of TKN peaked in West Pond, a reflection of algal productivity there, but declined by a half from 1975 to 1980 showing the improvement with time as the result of improved treatment in the expanded water pollution control plant.

Nitrite is normally a very transitory intermediate in the nitrification of ammonia to nitrate, and is often oxygen limited. If sufficient oxygen and Nitrobacter bacteria are present to complete the process, nitrite is normally converted quite rapidly to nitrate. Like most of the other parameters, nitrite levels were always higher in the more westerly locations, but were most similar in 1975 and 1980 while considerably lower in 1979 (Figure 7). Nitrite declined by a half in 1975 while flowing over the Desjardins

Canal sediments, between the discharge and Olympic Drive. After those sediments had been removed, nitrite increased by a half in the same zone in 1979 and 1980. The pattern of decline through West Pond continued and may reflect algal and plant uptake rather than nitrification, for nitrate declined sharply as well.

It appears conditions in 1979 favoured nitrification as total ammonium, TKN and nitrite nitrogen levels tended to be at their lowest that year while nitrate was highest. Particularly noteworthy was the 15 mg/l of nitrate and low levels of total ammonium, TKN and nitrite present at CP10, indicating good nitrification in the WPCP.

4.1.1.3 Chlorophyll

Chlorophyll is a photosynthetic pigment common to green plants and its concentration in a sample of water may be taken as an indication of algal productivity in response to various nutrients, sunlight, temperature and other environmental factors. Comparative data presented in Table 31 and Figure 9 indicate a general reduction in chlorophyll a concentrations with time. In most cases, 1980 chlorophyll a levels were less than 1/3 of those recorded in 1972 or 1975. Dobson et al (1974) and Vollenweider et al (1974) proposed a trophic classification of water bodies based on chlorophyll a measurement. By this scale, waters with greater than 8.8 mg/m^3 of chlorophyll a would be considered eutrophic. Mean values for all locations in 1979 and 1980 exceeded this level by a factor of 3 to 6 while West Pond exceeded it by a factor of 16. In 1972, Harris and Bacchus (1974) documented a peak of 3900 mg/m^3 in West Pond, claiming it was the highest level ever reported in the literature. Algal productivity there has declined steadily in the interim. The mean chlorophyll a concentration in West Pond in 1980 was about 1/3 that in 1975, and was even considerably reduced compared to 1979. This latter point parallels the patterns set by total phosphorus, which similarly declined by about 1/2 between 1979 and 1980 at CP6 (Figure 2), and by organic nitrogen, which always peaked in West Pond but declined with time through 1980 (Figure 6).

4.1.2 Suspended Solids

Suspended Solids levels varied widely with time and among stations (Table 32). Highest levels tended to be recorded at the open water stations where wind mixing and other factors resulted in sediment resuspension (CP6, CP5, CP2 and CP1). The 1979 levels tended to be the highest recorded for stations east of West Pond with the exception of CP3.

Suspended Solids levels at CP8 and CP10 declined with time but still exceeded the 5 mg/l target of the Certificate of Approval by a factor of 4. Granted the WPCP flows have remained well under the 4 MGD rated capacity, but mean solids loadings were nonetheless excessive. This point will be dealt with in greater detail in Section 4.5.

4.1.3 Biochemical Oxygen Demand

The Biochemical Oxygen Demand (BOD_5) test measures the amount of oxygen consumed by decomposition of mainly carbonaceous organic matter contained in a sample over a five day test period. A high BOD_5 may deplete dissolved oxygen levels to produce avoidance or even toxic conditions for fish and invertebrates.

Mean BOD_5 levels peaked at CP7 at 44 mg/l in 1975 while conditions from Olympic Drive to Spencer Creek generally exceeded 20 mg/l (Table 33). Sediment mining along the Desjardins Canal almost tripled the BOD_5 between the discharge and CP7 in that year. Levels east of Spencer Creek were relatively lower but still 2 to 5 times the levels expected in a typical Southern Ontario waterbody.

By 1980, BOD_5 levels had been reduced at all stations to less than 10 mg/l, especially west of Spencer Creek. The more easterly open water stations had been reduced by one-third to one-half compared to 1975 but not as dramatically as at the more western stations.

4.1.4 Metals

Mean metal data for the three years of study are presented in Table 34 for comparison. As for most other parameters, the Paradise is split east and west near Spencer Creek with respect to metals concentrations, with higher levels generally being found to the west. Overall, metals levels tended to decrease with time although not uniformly so. In some cases there were slight increases.

The 1975 study found iron and manganese to originate mainly from tributary streams. This would account for the variability among stations and relative stability with time. Iron tended to decline at most stations but was quite stable at CP7 and West Pond. The WPCP effluent concentration was decreased by about one-half. Compared to the PWQO of 0.3 mg/l most stations were in the range of 1 to 2 mg/l. Manganese varied within a factor of about 2, increasing or decreasing with time depending on location. It was quite stable in the WPCP effluent as measured at either CP8 or CP10. No PWQO exists for this element.

Zinc, copper, lead, cadmium and arsenic had been found to originate primarily from the WPCP in 1975, as well as in sediments accumulated in the western portions of the Desjardins Canal. The effect of sediment dredging upstream of CP7 and CP8 is quite noticeable in the reduced concentrations of zinc and copper. The remaining metals did not seem to be affected by that work and some even increased slightly with time (eg., lead in West Pond).

Provincial Water Quality Objectives for copper and cadmium were consistently exceeded throughout Cootes Paradise (Table

34) while those for zinc and lead were often satisfied, particularly in later years and at the more eastern sampling locations.

4.1.5 Winter Survey 1984/85: Total Kjeldanl Nitrogen

Since the Certificate of Approval was put in place in 1977, the 80 lbs/day (36 kg/day) loading limit for total Kjeldahl nitrogen has been routinely exceeded during winter months. During this colder period of the year, nitrifying bacteria are inhibited and the bacterial conversion of total ammonium to nitrite and nitrate known as nitrification virtually ceases at about 6°C. While below that temperature, conventional treatment technology will not produce effective removal of TKN. The Regional Municipality of Hamilton-Wentworth requested an increase in the loading limit to reflect that reality. The Ministry responded that some increase was feasible during the period November 1 to April 30, while maintaining the best practical treatment. Essentially, this proposal would make the Certificate of Approval more realistic. Concerns were expressed by the Royal Botanical Gardens and so the Ministry was asked to conduct a study of the WPCP impact during winter months.

Winter monitoring results presented in Table 21 indicate an increase in TKN in the discharge (CP8) over summer levels to 10.3 to 18.1 mg/l of which 90-100% is in the form of total ammonium. These conditions persisted through West Pond until dilution by Spencer Creek. TKN and total ammonium concentrations were stable at the levels mentioned throughout the winter. Assuming pH 7.8 and temperature 1°C (conversion factor of 0.50%), this resulted in an un-ionized ammonia concentration of about three times the Provincial Water Quality Objective of 0.02 mg/l. This Objective is not normally applied at the point of discharge and the comparison is made here simply to indicate that with only minor mixing and dilution, the Objective could be satisfied quite readily. Even with the high levels of TKN and total ammonium being discharged, the low temperatures prevent the development of toxic conditions. Dissolved oxygen levels measured under the ice remained acceptable throughout the winter. By the time water temperatures reached 10°C in April, TKN and total ammonium levels were already on the decline as nitrification got started for the summer season.

The Pollutech study of the Dundas WPCP was underway over the winter of 1984-85. Their experimental manipulation of operating conditions resulted in abnormally high TKN levels (Van Biesbrouck, personal communication). Over the winter of 1985-86, operating conditions had returned to normal, with resultant TKN levels of approximately 4 mg/l being typical (Vogt, personal communication). Although no winter survey was conducted in Cootes Paradise during the latter period, it is expected that TKN levels would have been significantly lower than the previous year.

Throughout the winter, ice conditions often extended to bottom in many parts of West Pond so that there appeared to be few areas where fish could congregate. The gradually rising ammonium levels in the fall of the year would probably produce an avoidance response, driving fish from the Pond. Following ice out, there was no evidence of a winter kill of fish in West Pond, nor have we ever received reports to that effect in previous years.

Based on this review, it appears that although exceeding the PWQO for un-ionized ammonia in West Pond there have been no documented impacts as a result of elevated winter discharges of TKN and total ammonium.

Our review of TKN discharges has indicated the 80 lbs/day (36 kg/day) limit can be satisfied while temperatures exceed 10°C, i.e. May 1 to October 31 approximately. Throughout the balance of the year, thermal conditions limit or prevent nitrification so that the TKN discharge loading may exceed the 80 lb/day limit. Since no adverse impacts were determined, even at the extreme winter TKN and total ammonium levels prevailing in 1984-85, it is not anticipated that problems will result from normal operation of the plant at its existing hydraulic capacity. For that reason, the requirement for nitrification during winter months could be deleted from the Certificate of Approval provided that the best achievable removal of TKN be continued while meeting limits for BOD, suspended solids and total phosphorus.

4.2 Sediment Chemistry

The surface fractions of the 1980 core samples may be compared to the surface grabs collected in 1975 (Tables 22 to 28). The location of CP1 had been changed and so no direct comparisons can be made there. At CP2 there was a 25% increase in manganese while at CP3 TKN increased by a factor of five and copper, zinc, lead, manganese and aluminum approximately doubled. Zinc increased by half and TKN more than doubled at CP4. All other parameters at these locations remained relatively stable. The greatest changes occurred west of Spencer Creek, most particularly at stations CP7 and CP8 where the Desjardins Canal had been dredged in the interim. At the latter locations, copper, zinc, lead, cadmium, arsenic, loss on ignition (LOI) and TKN were reduced 50% to 85%. Total phosphorus was reduced by half at CP7 but increased slightly at CP8. Manganese, iron and aluminum increased by 30% to 90%.

In West Pond, there were minor increases in manganese and aluminum and minor decreases in arsenic and LOI. But most notably TKN doubled and total phosphorus almost tripled compared to 1975. As discussed in an earlier section, West Pond acted as a phosphorus sink in 1975, trapping about 40% of the phosphorus load from the water column. In 1979, it was a net source of waterborne total phosphorus which approximately doubled (Figure 2). That condition was short

lived and by 1980, total phosphorus decreased slightly through West Pond.

In both 1975 and 1980, the pattern of increase and decline of phosphorus concentrations is similar for both water and sediment. As one changes, the other follows. Water of course is the transport medium and may simply be flushing the phosphorus peak further downstream and it is not being replenished by new loadings from the WPCP. This condition may indicate a long term continuing reduction in phosphorus availability and resultant algal productivity.

4.3 Invertebrate Biology

The benthic community of Cootes Paradise was dominated by midge fly larvae (Chironomidae) and sludge worms (Tubificidae), and the number of organisms was often very limited (Table 29). Both of the groups mentioned contained taxa which are known to be very tolerant of degraded environmental conditions. For example, certain of the Tubificids have been known to survive brief periods in the complete absence of dissolved oxygen, relying solely on anaerobic utilization of carbohydrate reserves (Barnes, 1968). Several of these taxa possess haemoglobin-like respiratory pigments which facilitate oxygen uptake at very low oxygen tensions.

With the exception of just five individuals, all invertebrates collected in 1975 were either Annelids (worms and leeches) or Dipteran larvae (two winged flies, some of which breathe atmospheric air and are completely independent of dissolved oxygen in the water). Greatest numbers and variety were found at old station CP9 at the extreme west end of the Desjardins Canal, an area essentially unaffected by the WPCP discharge. The community at CP8 and CP10 could be described as impoverished: few taxa and very few organisms. Conditions at CP7 were extremely toxic and no benthic organisms were found. Further east, a maximum of six taxa were found at CP5 although the number of organisms had increased relative to CP8 and 10.

Subsequent sampling, even as early as 1977, revealed a greater variety of taxa, up to 14 at CP4, although the number of organisms did not increase substantially. New taxa appearing in 1977 to 1980 included beetles, amphipods, sow bugs, snails, clams, water boatmen and even a mayfly. Communities at the more western stations remained very restricted in both taxa and numbers, with midges and sludge worms remaining the common taxa. Toxic conditions at CP7 had improved although still only a few worms and midges were present.

The benthic community of Cootes Paradise as revealed by this survey had improved relative to 1975 but remained relatively degraded.

4.4 Nutrient Limitation

During 1975 and the 1972 study by Harris & Bacchus it was determined that, due to the surplus of phosphorus available in the system, nitrogen had become the nutrient element limiting primary productivity. That is, any change in the amount of nitrate nitrogen available to the plants and algae in Cootes Paradise and especially West Pond, would result in a corresponding change in their growth and density.

Table 36 presents nitrogen to phosphorus ratios for each of the study years. There was considerable variation in the ratios even at open water stations. 1979 was the peak year at 8 of the 11 stations including all of the 6 western stations, while CP1 peaked in 1975 and CP2 and CP4 peaked in 1980. The most pronounced changes occurred at the more westerly stations such as CP7 (1.2 in 1975; 132.7 in 1979; and 45.0 in 1980). The improved nitrification and coincident reduction in phosphorus concentrations are the reasons for the changing ratios.

As noted in the earlier discussion of phosphorus, the proportion of the total phosphorus in soluble form in the Desjardins Canal and West Pond declined sharply between 1975 and 1980. These proportions were 74% and 60% in 1975 but had been reduced to 19% and 6% in 1979. Soluble phosphorus is readily available for plant and algae growth and had been largely consumed in 1979, again supporting the hypothesis that phosphorus had become the limiting nutrient. This shift is also reflected in the reduced algae production depicted by falling chlorophyll *a* concentrations over the period of records (Figure 9).

4.5 Monitoring of Compliance with the Certificate of Approval Loading Limits

Using the mean concentrations for BOD_5, suspended solids, TKN and total phosphorus at both CP8 and CP10 for both 1979 and 1980, and the monthly mean daily discharge volumes from the WPCP (Table 37) averaged for the period of the study, mean daily loadings were calculated (Table 38).

The Certificate of Approval for the WPCP discharge specifies loading limits for BOD_5, suspended solids, TKN and total phosphorus of 200, 200, 80 and 20 lbs/day respectively, entering Cootes Paradise. By convention, the point of measurement has been downstream from the aeration basin, which is part of the WPCP, at Olympic Drive (CP8).

During 1979, BOD_5 was indadvertently omitted from the parameters monitored, but TKN and total phosphorus loading limits were satisfied that year at both CP8 and CP10. However, the 200 lbs/day limit for suspended solids was substantially exceeded at both locations of measurement. It was interesting to note that during 1979 the suspended solids load was reduced by 132 lbs/day as a result of passage through the aeration basin.

In 1980, BOD_5, TKN and total phosphorus limits were met at Olympic Drive although the TKN limit was exceeded by 50% at CP10. Again, the suspended solids limit was exceeded, by more than 100%, at both locations. In 1980, the suspended solids load increased by about 10% (40 lbs/day) during the passage through the aeration basin. Considering both 1979 and 1980 results, it is therefore suspected that factors other than the aeration process are responsible for the increase in solids through this reach. In any case, even at the point of discharge to the west end of the Canal, the suspended solids loading limit was substantially exceeded.

Note that the mean discharge flows from the WPCP were only 35% to 50% of the 4 MGD design rating of the plant. At the design flow, the recorded concentrations would have yielded exceedences of loading limits for all four parameters. Obviously, improved operation of the WPCP will be required in order to achieve the existing Certificate of Approval limits as design flows are approached.

5. REFERENCES

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Table : 1

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-1 Outlet from Cootes

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Bacteria / 100 ml Total	Bacteria / 100 ml Fecal	Bacteria / 100 ml Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				6	6	6	6	6	6
	Mean				37433	3621	69	22	0.24	0.032
	Std. Dev.								0.078	0.029
1980	No. Samples	16	16	13	16	16	16	16	15	16
	Mean	9.6	16.8	4.6	23679	2881	137	50	0.193	0.023
	Std. Dev.	3.4	4.8	2.1					0.092	0.013

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjed. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	6	6	6	6	6	6	6	5	5
	Mean	0.776	2.9	0.153	1.285	63.17	369.5	103.8	59.1	8.7
	Std. Dev.	0.717	0.575	0.089	0.638	5.34	168.5	130.7	22.1	7.2
1980	No. Samples	16	15	16	16	15	16	16	16	16
	Mean	0.283	1.65	0.105	1.04	49.8	389.0	49	49.2	7.8
	Std. Dev.	0.229	0.57	0.090	0.76	8.9	58.3	31.4	35.9	7.6

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	6	6	6	6	6	6	6	6	6
	Mean	179.2	8.15	569.2	1.78	0.162	0.042	0.0092	0.016	0.0098
	Std. Dev.	122.9	0.331	41.3	1.82	0.09	0.018	0.0058	0.002	0.0068
1980	No. Samples	16	16	16	16	16	12	12	12	12
	Mean	132.0	7.93	519.0	1.82	0.170	0.045	0.0130	0.040	0.0040
	Std. Dev.	35.7	0.270	37.8	1.28	0.075	0.045	0.0060	0.020	0.0010

Table : 2

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-2 Cootes Mid Basin

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				6	6	6	6	6	6
	Mean				9068	258	26	22	0.287	0.0175
	Std. Dev.								0.091	0.0144
1980	No. Samples	16	16	13	16	16	16	16	15	15
	Mean	10.2	16.8	4.5	12085	1057	66	35	0.181	0.017
	Std. Dev.	2.5	6.0	1.9					0.093	0.011

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjed. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	6	6	6	6	6	6	6	5	5
	Mean	0.233	2.62	0.064	0.288	59.20	411.5	152.3	67.4	6.3
	Std. Dev.	0.204	0.770	0.035	0.327	4.82	177.7	143.6	32.3	1.6
1980	No. Samples	15	15	14	14	15	16	16	16	16
	Mean	0.150	1.61	0.073	0.72	48.5	430.0	57	48.7	5.0
	Std. Dev.	0.122	0.58	0.060	0.33	9.5	61.0	32.0	39.7	4.3

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	6	6	6	6	6	6	6	6	6
	Mean	150.0	8.17	575.0	2.52	0.218	0.025	0.0150	0.032	0.0058
	Std. Dev.	28.9	0.330	37.2	1.76	0.11	0.016	0.0075	0.002	0.0010
1980	No. Samples	16	16	16	16	16	12	12	12	12
	Mean	151.0	8.06	518.0	1.96	0.180	0.030	0.0100	0.030	0.0050
	Std. Dev.	49.6	0.270	152.0	1.07	0.070	0.010	0.0060	0.003	0.0020

Table : 3

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-3 Desjardins Canal Outlet to Mid Basin

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 'mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				6	6	6	6	6	6
	Mean				63493	5266	351	114	0.121	0.0190
	Std. Dev.								0.041	0.0048
1980	No. Samples	16	16	13	16	16	16	16	16	16
	Mean	9.5	14.8	3.0	33388	4098	428	363	0.151	0.072
	Std. Dev.	2.7	7.2	1.7					0.122	0.242

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	6	6	6	6	6	6	6	5	5
	Mean	0.095	1.16	0.037	0.515	45.30	503.3	41.8	35.6	3.3
	Std. Dev.	0.032	0.394	0.022	0.184	12.09	98.3	26.4	36.9	2.1
1980	No. Samples	16	16	15	15	15	16	16	15	15
	Mean	0.165	1.19	0.045	0.65	47.6	452.0	32	37.2	6.2
	Std. Dev.	0.162	0.64	0.040	0.37	14.4	63.0	28.0	53.1	8.3

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	6	6	6	6	6	6	6	6	6
	Mean	203.8	8.39	635.8	1.20	0.145	0.013	0.0120	0.032	0.0058
	Std. Dev.	17.6	0.103	47.7	0.63	0.06	0.007	0.0055	0.002	0.0010
1980	No. Samples	15	16	16	16	16	12	12	12	12
	Mean	193.0	8.21	614.0	1.50	0.160	0.020	0.0100	0.030	0.0040
	Std. Dev.	28.0	0.240	60.0	1.04	0.070	0.010	0.0030	0.010	0.0010

Table : 4

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-4 Desjardins Canal Downstream Spencer Creek

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				6	6	6	6	6	6
	Mean				61209	4484	445	252	0.262	0.0230
	Std. Dev.								0.200	0.0116
1980	No. Samples	16	16	13	16	16	16	16	16	16
	Mean	10.2	14.2	2.7	34647	3822	299	440	0.170	0.017
	Std. Dev.	3.9	6.6	1.8					0.137	0.014

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	6	6	6	6	6	6	6	5	5
	Mean	0.119	1.79	0.110	0.790	53.90	552.8	61.2	71.8	7.7
	Std. Dev.	0.110	1.150	0.090	0.450	17.60	109.1	37.6	104.7	5.0
1980	No. Samples	16	16	14	14	15	16	16	16	16
	Mean	0.315	1.56	0.099	1.103	55.5	471.0	32.5	39.3	9.9
	Std. Dev.	0.452	0.946	0.127	0.906	22.7	80.0	28.8	52.5	17.9

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	6	6	6	6	6	6	6	6	6
	Mean	197.3	8.43	652.5	2.01	0.220	0.020	0.0100	0.030	0.0058
	Std. Dev.	34.7	0.260	57.3	1.61	0.180	0.013	0.0097	0.003	0.0010
1980	No. Samples	16	16	16	16	16	12	12	12	12
	Mean	189.0	8.35	651.0	1.24	0.150	0.020	0.0100	0.030	0.0040
	Std. Dev.	36.0	0.210	77.0	0.99	0.060	0.010	0.0100	0.010	0.0010

Table : 5

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-5 North Channel Upstream Hopkins Cr.

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				6	6	6	6	6	6
	Mean				103708	945	39	110	0.680	0.0570
	Std. Dev.								0.330	0.0587
1980	No. Samples	12	12	10	12	12	12	12	12	12
	Mean	9.4	16.2	2.8	25289	1129	137	120	0.207	0.0390
	Std. Dev.	3.8	3.9	7.2					0.114	0.0350

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	6	6	6	6	6	6	6	5	5
	Mean	0.310	5.66	0.280	2.830	90.00	623.7	97.5	181.7	22.2
	Std. Dev.	0.350	1.470	0.079	1.240	13.01	87.3	51.1	139.1	19.8
1980	No. Samples	11	12	10	10	11	12	12	11	11
	Mean	1.176	2.80	0.277	1.740	68.0	510.0	37.0	26.8	4.1
	Std. Dev.	1.382	1.89	0.250	1.835	28.2	35.0	3.1	20.0	3.9

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	6	6	6	6	6	6	6	6	6
	Mean	142.8	8.70	712.5	2.33	0.250	0.023	0.0150	0.033	0.0080
	Std. Dev.	55.5	0.620	128.6	1.13	0.076	0.015	0.0070	0.0104	0.0070
1980	No. Samples	12	12	12	12	12	11	11	11	11
	Mean	174.0	8.06	723.0	1.29	0.170	0.020	0.0100	0.030	0.0040
	Std. Dev.	40.0	0.300	96.0	0.77	0.110	0.010	0.0000	0.004	0.0020

Table : 6

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-6 West Pond

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				6	6	6	6	6	6
	Mean				31597	492	50	98	0.830	0.0530
	Std. Dev.								0.400	0.0662
1980	No. Samples	20	20	15	20	19	19	19	20	20
	Mean	13.0	17.1	7.4	32089	351	31	51	0.476	0.064
	Std. Dev.	4.6	6.4	1.9					0.199	0.058

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	6	6	6	6	6	6	6	5	5
	Mean	0.342	5.56	0.310	4.140	93.33	570.8	217.7	242.6	30.5
	Std. Dev.	0.380	1.350	0.099	1.310	10.58	222.4	227.2	91.6	9.8
1980	No. Samples	19	19	19	19	18	20	20	20	20
	Mean	0.926	3.92	0.439	3.860	92.3	614.0	89.0	144.8	12.3
	Std. Dev.	1.153	1.39	0.538	3.590	18.3	89.0	62.0	103.8	17.5

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	6	6	6	6	6	6	6	6	6
	Mean	119.3	8.68	732.0	3.00	0.270	0.030	0.0200	0.032	0.0080
	Std. Dev.	40.5	0.560	52.6	1.61	0.038	0.023	0.0060	0.020	0.0030
1980	No. Samples	20	20	20	15	15	12	12	12	12
	Mean	155.0	8.01	794.0	2.50	0.260	0.030	0.0100	0.030	0.0040
	Std. Dev.	39.0	0.490	82.0	1.30	0.110	0.020	0.0050	0.000	0.0010

Table : 7

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-7 Desjardins Canal Downstream dredging / Upstream West Pond

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				7	7	7	7	7	7
	Mean				11999	411	32	20	0.410	0.0770
	Std. Dev.								0.100	0.0480
1980	No. Samples	14	14	11	14	14	14	14	14	14
	Mean	10.5	18.3	6.8	14780	500	22	21	0.444	0.1510
	Std. Dev.	3.8	6.0	2.0					0.162	0.1110

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	7	7	7	7	7	7	7	6	6
	Mean	1.260	3.65	0.450	10.270	106.60	553.4	34.7	79.3	5.2
	Std. Dev.	1.350	1.570	0.240	4.400	7.66	143.0	12.1	69.8	5.1
1980	No. Samples	14	14	14	14	13	14	14	14	14
	Mean	2.490	4.31	1.200	6.790	107.2	604.0	24.0	45.6	4.8
	Std. Dev.	1.300	1.15	1.070	2.780	17.1	59.0	10.0	44.5	6.9

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	7	7	7	7	7	7	7	7	7
	Mean	144.1	8.00	863.6	0.84	0.014	0.016	0.0140	0.031	0.0060
	Std. Dev.	110.0	0.480	68.0	0.21	0.035	0.007	0.0080	0.002	0.0009
1980	No. Samples	14	14	14	14	14	11	11	11	11
	Mean	124.0	7.78	882.0	0.93	0.150	0.200	0.0100	0.030	0.0050
	Std. Dev.	28.0	0.270	54.0	0.34	0.040	0.600	0.0100	0.000	0.0010

Table : 8

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-8 Desjardins Canal at Olympic Drive

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				7	7	7	7	7	7
	Mean				26889	563	43	21	0.520	0.1800
	Std. Dev.								0.220	0.0850
1980	No. Samples	16	16	13	15	15	15	15	16	15
	Mean	9.5	18.1	6.2	14891	717	27	22	0.512	0.2270
	Std. Dev.	1.9	5.3	2.1					0.193	0.1680

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	7	7	7	7	7	7	7	6	6
	Mean	0.820	3.46	0.390	14.030	105.43	614.3	24.3	39.1	3.0
	Std. Dev.	0.590	2.070	0.210	2.870	9.50	47.4	9.9	41.2	2.8
1980	No. Samples	15	15	14	14	15	16	16	16	16
	Mean	2.920	4.20	1.240	8.420	101.2	602.0	23.0	27.8	4.1
	Std. Dev.	1.320	1.33	1.120	2.990	18.9	59.0	6.0	24.7	3.7

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	7	7	7	7	7	7	7	7	7
	Mean	99.9	7.99	879.3	0.68	0.120	0.020	0.0200	0.030	0.0060
	Std. Dev.	28.6	0.300	59.2	0.37	0.038	0.011	0.0080	0.009	0.0030
1980	No. Samples	16	16	16	16	16	12	12	12	12
	Mean	119.0	7.64	876.0	0.80	0.130	0.020	0.0100	0.030	0.0040
	Std. Dev.	24.0	0.210	55.0	0.21	0.040	0.010	0.0100	0.010	0.0010

Table : 9

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-9 Aeration Basin at Gabion Berm

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				7	7	7	7	8	8
	Mean				16007	995	44	29	1.000	0.3300
	Std. Dev.								0.150	
1980	No. Samples	16	16	13	16	16	16	16	16	15
	Mean	9.0	17.7	7.9	12332	915	36	46	0.926	0.3930
	Std. Dev.	1.7	4.9	4.0					0.530	0.3930

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	8	8	8	8	7	7	7	7	7
	Mean	1.960	3.36	0.440	13.520	105.86	646.1	46.3	18.1	2.7
	Std. Dev.	2.250	2.010	0.460	5.230	9.35	36.8	12.6	16.5	1.7
1980	No. Samples	15	16	13	13	15	16	16	16	16
	Mean	3.360	5.24	1.310	8.210	102.4	602.0	30.0	6.6	1.7
	Std. Dev.	1.680	1.47	1.140	2.050	13.3	50.0	16.0	4.9	1.4

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	7	7	7	7	7	7	7	7	7
	Mean	96.3	7.76	886.4	1.15	0.140	0.050	0.0260	0.031	0.0060
	Std. Dev.	24.6	0.150	55.6	0.35	0.037	0.008	0.0080	0.002	0.0030
1980	No. Samples	16	16	16	16	16	12	12	12	12
	Mean	116.0	7.62	874.0	0.94	0.130	0.030	0.0100	0.030	0.0040
	Std. Dev.	28.0	0.220	58.0	0.45	0.030	0.010	0.0030	0.010	0.0020

Table : 10

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-10 Aeration Basin Near WPCP Outfall

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Bacteria / 100 ml Total	Bacteria / 100 ml Fecal	Bacteria / 100 ml Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				7	7	7	7	8	8
	Mean				380	355	125	40	1.080	0.1800
	Std. Dev.								0.560	0.068
1980	No. Samples	16	16	13	16	16	16	16	15	14
	Mean	9.0	17.0	5.2	704	166	16	15	0.866	0.4360
	Std. Dev.	1.7	4.4	4.7					0.444	0.4220

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	8	8	8	8	7	7	7	6	6
	Mean	1.290	2.69	0.190	15.140	107.29	656.7	33.0	3.9	3.8
	Std. Dev.	1.370	1.300	0.150	5.640	12.20	14.1	29.9	3.5	5.6
1980	No. Samples	14	16	15	15	15	16	16	16	16
	Mean	5.020	6.63	0.878	7.010	102.9	583.0	21.0	5.8	1.1
	Std. Dev.	2.110	2.28	1.219	2.380	10.2	82.0	11.0	13.7	0.7

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	7	7	7	7	7	7	7	7	7
	Mean	85.6	7.48	895.7	0.65	0.110	0.040	0.0240	0.031	0.0060
	Std. Dev.	17.3	0.220	32.1	0.60	0.049	0.015	0.0170	0.002	
1980	No. Samples	15	16	16	16	16	12	12	12	12
	Mean	131.0	7.51	895.0	0.41	0.130	0.030	0.0100	0.030	0.0040
	Std. Dev.	23.0	0.130	44.0	0.24	0.020	0.010	0.0100	0.003	0.0020

Table : 11

Water Chemistry Data Summary for Cootes Paradise
During 1979 and 1980

Station : CP-11 Outlet of Chedoke Creek

Year	Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	Bacteria / 100 ml Backgrd.	Bacteria / 100 ml Total	Bacteria / 100 ml Fecal	Bacteria / 100 ml Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
1979	No. Samples				6	6	6	6	6	6
	Mean				78673	6545	498	66	0.330	0.0170
	Std. Dev.								0.096	0.005
1980	No. Samples	16	16	13	16	16	16	16	16	16
	Mean	9.3	17.2	5.9	193761	62615	2126	619	0.359	0.1020
	Std. Dev.	3.3	5.7	2.0					0.165	0.1070

Year	Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Chlor. A (ug/l)	Chlor. B (ug/l)
1979	No. Samples	6	6	6	6	6	6	6	6	6
	Mean	0.720	3.24	0.100	0.890	81.17	541.7	64.0	121.3	9.7
	Std. Dev.	0.280	0.710	0.037	0.340	17.26	44.4	34.3	66.8	2.6
1980	No. Samples	15	16	15	15	15	16	16	15	15
	Mean	1.470	3.14	0.145	1.770	82.0	527.0	39.9	45.6	4.7
	Std. Dev.	1.770	1.41	0.099	1.610	24.5	91.0	20.4	49.3	4.8

Year	Remarks	Alk'y (mg/l)	pH	Cond. (umho/cm)	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)
1979	No. Samples	6	6	6	6	6	6	6	6	6
	Mean	168.2	7.89	717.5	2.06	0.220	0.038	0.0180	0.032	0.0060
	Std. Dev.	23.3	0.430	63.4	1.34	0.084	0.022	0.0088	0.002	
1980	No. Samples	16	16	16	16	16	11	12	12	12
	Mean	165.0	7.69	728.0	1.76	0.200	0.050	0.0200	0.030	0.0040
	Std. Dev.	43.0	0.320	177.0	0.67	0.060	0.030	0.0100	0.010	0.0010

Table : 12

Water Chemistry Data Summary for Tributary Streams of Cootes Paradise During 1980

Hickory Brook

Remarks	D.O. (mg/l)	Temp. °C.	BOD5 (mg/l)	COD (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
No. Samples	14	14	14	1	14	14	14	14	14	14
Mean	9.55	15.3	0.91	26	21968	2255	183	600	0.127	0.022
Std. Dev.	1.42	5.81	0.46						0.091	0.013

Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Alk'y (mg/l)	pH	Turbidity (FTU)
No. Samples	13	14	14	14	14	14	14	14	14	2
Mean	0.045	0.47	0.007	0.192	44.6	549.0	29.0	313	8.22	1.75
Std. Dev.	0.030	0.23	0.005	0.130	13.9	50.8	38.0	52.7	0.115	0.354

Remarks	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)	Arsenic (mg/l)	Silica (mg/l)	Sulphate (mg/l)	Sodium (mg/l)
No. Samples	14	14	10	10	10	10	10	2	2	2
Mean	1.32	0.28	0.014	0.01	0.33	0.004	0.002	2.43	95.0	32.5
Std. Dev.	1.82	0.16	0.007	0.00	0.94	0.001	0.001	0.39	1.41	0.70

Remarks	Potassium (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Cond. (umho/cm)
No. Samples	2	2	2	14
Mean	3.05	87.5	31.5	810
Std. Dev.	0.35	10.6	0.7	74.1

Table : 13

Water Chemistry Data Summary for Tributary Streams of Cootes Paradise During 1980

Long Valley Brook

Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	COD (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
No. Samples	8	8	8	1	7	7	7	7	8	8
Mean	8.20	12.9	1.70	14	16962	872	28	402	0.160	0.016
Std. Dev.	2.60	4.80	1.50						0.047	0.006

Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Alk'y (mg/l)	pH	Turbidity (FTU)
No. Samples	8	8	8	8	8	8	8	8	8	2
Mean	0.037	0.70	0.017	0.098	32.3	540.0	54.0	333	7.71	4.80
Std. Dev.	0.019	0.31	0.025	0.104	13.9	97.5	61.9	61.9	0.126	1.560

Remarks	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)	Arsenic (mg/l)	Silica (mg/l)	Sulphate (mg/l)	Sodium (mg/l)
No. Samples	8	8	8	8	8	8	8	8	8	8
Mean	2.65	1.22	0.010	0.01	0.03	0.004	0.002	3.85	74.8	17.5
Std. Dev.	1.96	1.04	0.007		0.01	0.002	0.001	0.28	0.35	0.71

Remarks	Potassium (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Cond. (umho/cm)
No. Samples	2	2	2	8
Mean	2.63	94.0	23.8	790
Std. Dev.	0.18	7.1	1.1	122.0

Table : 14

Water Chemistry Data Summary for Tributary Streams of Cootes Paradise During 1980

Chedoke Creek at Main Street

Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	COD (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
No. Samples	14	14	14	1	14	14	14	14	14	13
Mean	14.10	17.4	1.30	28	16801	2926	194	314	0.339	0.199
Std. Dev.	4.00	5.02	0.69						0.127	0.092

Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Alk'y (mg/l)	pH	Turbidity (FTU)
No. Samples	14	14	14	13	14	14	14	14	14	2
Mean	0.043	0.58	0.042	2.260	85.4	512.0	21.0	165	8.98	3.30
Std. Dev.	0.044	0.14	0.017	0.510	3.6	85.0	28.0	16.1	0.350	0.420

Remarks	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)	Arsenic (mg/l)	Silica (mg/l)	Sulphate (mg/l)	Sodium (mg/l)
No. Samples	14	14	10	10	10	10	10	2	2	2
Mean	0.39	0.03	0.030	0.03	0.04	0.004	0.001	3.13	132.0	54.0
Std. Dev.	0.51	0.02	0.020	0.04	0.02	0.002	0.001	0.18	9.20	2.10

Remarks	Potassium (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Cond. (umho/cm)
No. Samples	2	2	2	14
Mean	4.38	91.0	24.3	791
Std. Dev.	0.25	6.4	3.9	76.0

Table : 15

Water Chemistry Data Summary for Tributary Streams of Cootes Paradise During 1980

Westdale Brook

Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	COD (mg/l)	Bacteria / 100 ml Backgrd.	Bacteria / 100 ml Total	Bacteria / 100 ml Fecal	Bacteria / 100 ml Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
No. Samples	13	13	12	1	13	13	13	13	13	13
Mean	8.10	16.4	0.81	26	29125	6935	327	447	0.080	0.012
Std. Dev.	1.40	4.70	0.28						0.010	0.007

Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Alk'y (mg/l)	pH	Turbidity (FTU)
No. Samples	12	12	12	12	12	12	12	12	12	1
Mean	0.063	0.33	0.019	0.597	79.5	632.0	12.0	261	8.16	5.40
Std. Dev.	0.041	0.13	0.010	0.230	6.7	76.9	6.0	10.8	0.099	

Remarks	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)	Arsenic (mg/l)	Silica (mg/l)	Sulphate (mg/l)	Sodium (mg/l)
No. Samples	13	13	10	10	10	10	10	1	1	1
Mean	0.55	0.13	0.010	0.01	0.03	0.004	0.002	6.50	100.0	14.0
Std. Dev.	0.19	0.04	0.003	0.003	0.003	0.002	0.001			

Remarks	Potassium (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Cond. (umho/cm)
No. Samples	1	1	1	12
Mean	1.65	118.0	25.0	880
Std. Dev.				41.0

Table : 16

Water Chemistry Data Summary for Tributary Streams of Cootes Paradise During 1980

Spencer Creek behind Canadian Tire

Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	COD (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
No. Samples	14	14	13	1	14	14	14	14	14	14
Mean	9.80	17.5	0.97	40	18207	1533	200	366	0.052	0.008
Std. Dev.	2.20	6.10	0.29						0.039	0.005

Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Alk'y (mg/l)	pH	Turbidity (FTU)
No. Samples	14	14	14	14	14	14	14	14	14	2
Mean	0.026	0.59	0.007	0.444	40.5	414.0	17.0	201	8.65	2.90
Std. Dev.	0.018	0.16	0.004	0.239	9.1	34.7	25.2	25.8	0.190	0.14

Remarks	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)	Arsenic (mg/l)	Silica (mg/l)	Sulphate (mg/l)	Sodium (mg/l)
No. Samples	14	14	10	10	10	10	10	2	2	2
Mean	0.46	0.06	0.020	0.01	0.03	0.004	0.001	1.50	82.3	17.0
Std. Dev.	0.65	0.04	0.020	0.01	0.01	0.002	0.0004		42.1	

Remarks	Potassium (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Cond. (umho/cm)
No. Samples	2	2	2	14
Mean	2.65	74.0	25.8	587
Std. Dev.	0.21	2.8	2.5	43.4

Table : 17

Water Chemistry Data Summary for Tributary Streams of Cootes Paradise During 1980

Hopkins Creek at Olympic Drive

Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	COD (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
No. Samples	11	11	12	1	12	12	12	12	12	12
Mean	9.40	17.1	0.80	20	19435	2922	274	257	0.051	0.008
Std. Dev.	2.20	5.40	0.50						0.031	0.007

Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Alk'y (mg/l)	pH	Turbidity (FTU)
No. Samples	12	12	12	12	12	12	12	12	12	2
Mean	0.021	0.48	0.003	0.300	75.8	530.0	17.0	231	8.13	6.30
Std. Dev.	0.012	0.23	0.002	0.340	13.8	63.0	29.0	45.0	0.200	0.70

Remarks	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)	Arsenic (mg/l)	Silica (mg/l)	Sulphate (mg/l)	Sodium (mg/l)
No. Samples	12	12	9	9	9	9	9	2	2	2
Mean	0.53	0.07	0.010	0.01	0.03	0.005	0.001	2.10	58.0	29.0
Std. Dev.	0.47	0.06	0.004	0.003	0.004	0.001	0.0000	0.35	0.35	4.3

Remarks	Potassium (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Cond. (umho/cm)
No. Samples	2	2	2	12
Mean	3.90	86.0	20.5	784
Std. Dev.	0.21	3.5	2.1	86.0

Table : 18

Water Chemistry Data Summary for Tributary Streams of Cootes Paradise During 1980

Stream Behind Boathouse on R.B.G.

Remarks	D.O. (mg/l)	Temp. 'C.	BOD5 (mg/l)	COD (mg/l)	Bacteria / 100 ml Backgrd.	Total	Fecal	Strep.	Total Phosphorus (mg/l)	Sol. Phosphorus (mg/l)
No. Samples	8	8	8	1	8	8	8	8	8	8
Mean	8.80	15.8	1.10	20	36896	2409	70	336	0.078	0.018
Std. Dev.	1.70	5.10	0.90						0.033	0.010

Remarks	Total Ammonium (mg/l)	Tot. Kjel. Nitrogen (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Chloride (mg/l)	Total Solids (mg/l)	Susp. Solids (mg/l)	Alk'y (mg/l)	pH	Turbidity (FTU)
No. Samples	8	8	8	8	7	8	8	8	8	2
Mean	0.017	0.49	0.035	0.293	170.0	796.0	6.4	278	8.12	1.65
Std. Dev.	0.011	0.27	0.079	0.324	87.0	100.0	10.8	49.0	0.260	0.07

Remarks	Iron (mg/l)	Manganese (mg/l)	Zinc (mg/l)	Copper (mg/l)	Lead (mg/l)	Cadmium (mg/l)	Arsenic (mg/l)	Silica (mg/l)	Sulphate (mg/l)	Sodium (mg/l)
No. Samples	8	8	7	7	7	7	7	2	2	2
Mean	0.11	0.10	0.010	0.02	0.03	0.004	0.001	2.95	83.0	46.0
Std. Dev.	0.11	0.13	0.000	0.010	0.000	0.001	0.0000	0.42	45.00	5.7

Remarks	Potassium (mg/l)	Calcium (mg/l)	Magnesium (mg/l)	Cond. (umho/cm)
No. Samples	2	2	2	8
Mean	4.55	109.5	31.3	1072
Std. Dev.	0.07	0.7	3.2	146.0

Table : 19

Water Chemistry Data Summary
for Station CP-8 at Olympic Drive During 1984

TEST NAME:			FWSADP	FGPROJ	ALKT	BOD5	CHLRAT	CHLRBT	CLIDUR	CONDAM	COND25	CUUT
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	SAMPLE DEPTH M	PROJECT SUB-PROJ CODE	ALK TOTAL MG/L AS CACO3	BOD 5 DAY TOT.DEM. MG/L AS O	CHLORO-A TOTAL UG/L	CHLORO-B TOTAL UG/L	CHLORIDE UNF.REAC MG/L AS CL	CONDUCT. AMBIENT UMHO/CM AMBIENT	CONDUCT. 25C UMHO/CM AT 25 C	COPPER UNF.TOT. MG/L AS CU
840523	1115	100		20	191.3	7.54			112.75		949.0	0.006
840530		200		20	181.0	6.24	61.3	6.8	99.70		942.0	0.005
840612	0835	479	0.30	20	130.4	4.06			105.70	850	895.0	0.006
840614	0900	300		20	114.1				94.35		821.0	0.008
840618		400		20	143.2	5.40	2.5	0.6	93.25		792.0	0.006
840706	1000	500	0.30	20	158.0	5.92	19.7	7.6	101.20		909.0	0.007
840731	0755	491	0.30	20	120.7	4.16			103.75	800	884.0	0.006
840809	0905	600		20	147.2	19.32	126.0	8.7	105.40		836.0	0.005
840814	0850	499	0.30	20	139.3	1.71			26.36	820	857.0	0.003
		MAXIMUM	0.30		191.3	19.32	126.0	8.7	112.75	850	949.0	0.008
		ARITH MEAN	0.30		147.2	6.79	52.4	5.9	93.61	823	875.9	0.006
		GEOM MEAN			145.3	5.50	24.8	4.1	87.64	823	874.4	0.006
		MINIMUM	0.30		114.1	1.71	2.5	0.6	26.36	800	792.0	0.003
		STD DEV (GEOM *)			25.9	5.35	54.9	3.6	25.91	25	53.9	0.001
# SAMP IN STATISTICS			4		9	8	4	4	9	3	9	9

Table : 19 (cont'd)

Water Chemistry Data Summary
for Station CP-8 at Olympic Drive During 1984

TEST-NAME:			DO	DOC	FCMF	FSMF	FWPH	FWSTRC	FWTEMP	NNHTFR	NNOTFR
			DISOLVED	CARBON DISOLVED	FECAL COLIFORM	FECAL STREPCUS				NH3-N TOTAL	NO2+NO3N
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	OXYGEN MG/L AS O	ORGANIC MG/L AS C	MF CNT /100ML	MF CNT /100ML	PH FIELD	STREAM COND.	WATER TEMP DEG.C	FIL.REAC MG/L AS N	FIL.REAC MG/L AS N
840523	1115	100			1700	300(=)					8.600
840530		200			100(=)	20(					7.520
840612	0835	479	7.70		380	20(	8.00	8	23.0	0.800	14.900
840614	0900	300			3300	780				0.464	15.200
840618		400			89000	580				0.770	8.730
840706	1000	500		4.9	1000(	80(=)				1.570	12.100
840731	0755	491	10.70		100(=)	320	8.10	8	21.0	0.896	14.00
840809	0905	600			2100	650				2.820	7.980
840814	0850	499	9.00		280	280	8.30	8	23.5	2.560	6.730
		MAXIMUM	10.70	4.9	89000	780	8.30		23.5	2.820	15.200
		ARITH MEAN	9.13	4.9			8.13		22.5	1.411	10.64
		GEOM MEAN	9.05				8.13		22.5	1.164	10.17
		MINIMUM	7.70	4.9	100	80	8.00		21.0	0.464	6.730
		STD DEV (GEOM *)	1.50				0.15		1.3	0.938	3.40
		# SAMP IN STATISTICS	3	1	8	7	3		3	7	9

Table : 19 (cont'd)

Water Chemisry Data Summary
for Station CP-8 at Olympic Drive During 1984

TEST-NAME:			NNO2FR	NNTKUR	PBUT	PH	PHYV	PPO4FR	PPUT	RSF	RSP
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	NO2-N FIL.REAC MG/L AS N	K'DAHL N TOTAL FIL.TOT. MG/L AS N	LEAD UNF.TOT. MG/L AS PB	PH	PHYTO VOLU-METRIC MM3/L	PO4 FIL.REAC MG/L AS P	PHOSPHOR UNF.TOT. MG/L AS P	RESIDUE FILTERED MG/L	RESIDUE PARTIC. MG/L
840523	1115	100	1.0000	1.900	0.003	8.20		1.1300	1.060	630.0	19.930
840530		200	1.1000	2.020	0.003	8.29	2.758	0.4380	0.650	600.0	15.900
840612	0835	479	0.6650	1.570	0.003<	7.85		0.6950	0.940	590.0	22.810
840614	0900	300	0.2150	1.050	0.003	7.76	1.183	0.7280	0.860	556.0	59.090
840618		400	0.8580	2.000	0.005	7.49	0.199	0.2780	0.383	514.0	38.540
840706	1000	500	0.7320	3.000	0.007	7.98	0.332		1.150	598.0	19.440
840731	0755	491	0.4350	1.700	0.003<	7.66		0.3980	0.405	568.0	30.080
840809	0905	600	0.5830	5.100	0.007	7.75	6.787	1.5500	1.780	526.0	110.800
840814	0850	499	0.7700	3.500	0.003	8.18		0.4850	0.585	564.0	10.560
		MAXIMUM	1.1000	5.100	0.007	8.29	6.787	1.5500	1.780	630.0	110.800
		ARITH MEAN	0.7064	2.427	0.004	7.91	2.252	0.7127	0.868	571.8	36.350
		GEOM MEAN	0.6449	2.139		7.90	1.079	0.6164	0.777	570.7	28.196
		MINIMUM	0.2150	1.050	0.003	7.49	0.199	0.2780	0.383	514.0	10.560
		STD DEV (GEOM *)	0.2741	1.245		0.27	2.732	0.4295	0.437	37.0	31.477
		# SAMP IN STATISTICS	9	9	7	9	5	8	9	9	9
		% SAMP (EXCLUDED)			22						

Table : 19 (cont'd)

Water Chemistry Data Summary
for Station CP-8 at Olympic Drive During 1984

SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	TCMF COLIFORM TOTAL MF CNT /100ML	TCMFBK COLIFORM TOTAL MF BCKGRD CNT /100ML	TURB TURB'ITY FTU	ZNUT ZINC UNF.TOT. MG/L AS ZN
840523	1115	100	5400	21000	17.00	0.013
840530		200	5800	24000	14.20	0.014
840612	0835	479	3100(=)	30000	18.00	0.018
840614	0900	300	93000	112000	57.00	0.018
840618		400	109E+05(=)	280E+05	41.50	0.017
840706	1000	500	10000(	70000(=)	12.70	0.018
840731	0755	491	2000(=)	1120000	14.50	0.014
840809	0905	600	4900(=)	95000	82.00	0.014
840814	0850	499	1300(=)	83000	8.50	0.008
		MAXIMUM	109E+05	280E+05	82.00	0.018
		ARITH MEAN			29.49	0.015
		GEOM MEAN		145548	22.22	0.014
		MINIMUM	1300	21000	8.50	0.008
		STD DEV (GEOM *)			25.32	0.003
		# SAMP IN STATISTICS	8	9	9	9
		% SAMP (EXCLUDED)	11			

Table : 20

Concentrations and Loadings to Cootes Paradise
at Olympic Drive (CP-8) During 1984

Date	Flow (MGD)	BOD5 Conc. (mg/l)	BOD5 Loading (lb/day)	Susp. Solids Conc. (mg/l)	Susp. Solids Loading (lb/day)	T.K.N. Conc. (mg/l)	T.K.N. Loading (lb/day)	Tot. Phos. Conc. (mg/l)	Tot. Phos. Loading (lb/day)
May 23/84	4.382	7.54	330.4	19.9	873	1.90	83.3	1.060	46.5
May 30/84	3.131	6.24	195.4	15.9	498	2.00	63.2	0.650	20.4
June 12/84	2.681	4.06	1088.5	22.8	612	1.60	42.1	0.940	25.2
June 14/84	3.773	---	---	59.1	2230	1.05	39.6	0.860	32.5
June 18/84	6.848	5.40	369.8	38.5	2639	2.00	137.0	0.383	26.2
July 6/84	3.707	5.92	220.1	19.4	721	3.00	111.5	1.150	42.8
July 31/84	2.500	4.16	104.0	30.1	752	1.70	42.5	0.405	10.1
Aug 8/84	3.370	19.32	653.0	110.8	3745	5.10	172.4	1.780	60.2
Aug. 14/84	2.525	1.71	43.2	10.6	266	3.50	88.4	0.585	14.8
Allowable Loading			200.0		200		80.0		20.0

Table : 21

Water Chemistry Data Summary
for Cootes Paradise, Winter 1984/85

Station : CP-2 Cootes Mid Basin

TEST-NAME:			FGPROJ	BOD5	CHLRAT	CHLRBT	COND25	DIC	DOC	NNHTFR	NNOTFR	NNO2FR
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	PROJECT SUB-PROJ CODE	BOD 5 DAY TOT.DEM. MG/L AS O	CHLORO-A TOTAL UG/L	CHLORO-B TOTAL UG/L	CONDUCT. 25C UMHO/CM AT 25 C	CARBON DISOLVED INORGAN. MG/L AS C	CARBON DISOLVED ORGANIC MG/L AS C	NH3 N TOTAL FIL.REAC MG/L AS N	NO2+NO3N FIL.REAC MG/L AS N	NO2-N FIL.REAC MG/L AS N
850117	1130	2CP2	20	1.62	3.6	3.5	810.0	57.0	5.2	1.340	1.860	0.0580
850130	1125	3CP2	20		2.1	1.6	791.0	61.0	5.7	1.130	1.880	0.0235
850220	1230	4CP2	20	2.56	2.4	2.5	817.0	47.0	4.2	1.470	2.890	0.0375
850327	1315	5CP2	20	0.97	5.8	4.7	557.0	45.0	4.4	0.272	1.150	0.0235
850417	1200	6CP2	20	7.72	50.4	8.9	640.0	48.0	5.8	0.936	1.190	0.0715
		MAXIMUM		7.72	50.4	8.9	817.0	61.0	5.8	1.470	2.890	0.0715
		ARITH MEAN		3.22	12.9	4.2	723.0	51.6	5.1	1.030	1.794	0.0428
		GEOM MEAN		2.36	5.6	3.6	714.8	51.2	5.0	0.893	1.691	0.0386
		MINIMUM		0.97	2.1	1.6	557.0	45.0	4.2	0.272	1.150	0.0235
		STD DEV (GEOM A)		3.07	21.0	2.8	117.8	7.0	0.7	0.470	0.706	0.0214
		# SAMP IN STATISTICS		4	5	5	5	5	5	5	5	5

TEST-NAME:			NNTKUR	PH	PP04FR	PPUT	RSP	RST	TURB
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	K'DAHL N TOTAL FIL.TOT. MG/L AS N	PH	PO4 FIL.REAC MG/L AS P	PHOSPHOR UNF.TOT. MG/L AS P	RESIDUE PARTIC. MG/L	RESIDUE TOTAL MG/L	TURB'ITY FTU
850117	1130	2CP2	1.830	8.10	0.1030	0.135	4.172	500.2	4.20
850130	1125	3CP2	1.480	8.36	0.1050	0.149	14.750	544.8	9.10
850220	1230	4CP2	1.550	8.14	0.0670	0.083	11.940	486.4	9.10
850327	1315	5CP2	0.870	8.29	0.0180	0.107	71.250	403.2	18.40
850417	1200	6CP2	2.050	8.20	0.0685	0.415	188.900	589.0	52.00
		MAXIMUM	2.050	8.36	0.1050	0.415	188.900	589.0	52.00
		ARITH MEAN	1.556	8.22	0.0723	0.178	58.202	504.7	18.56
		GEOM MEAN	1.496	8.22	0.0617	0.149	25.063	500.7	12.72
		MINIMUM	0.870	8.10	0.0180	0.083	4.172	403.2	4.20
		STD DEV (GEOM A)	0.446	0.11	0.0354	0.135	77.781	69.6	19.39
		# SAMP IN STATISTICS	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)							

Table : 21 (cont'd)

Water Chemistry Data Summary
for Cootes Paradise, Winter 1984/85

Station : CP-3 Desjardins Canal Outlet to Mid Basin

TEST-NAME:			FGPROJ	BOD5	CHLRAT	CHLRBT	COND25	DIC	DOC	NNHTFR	NNOTFR	NNO2FR
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	PROJECT SUB-PROJ CODE	BOD 5 DAY TOT.DEM. MG/L AS O	CHLORO-A TOTAL UG/L	CHLORO-B TOTAL UG/L	CONDUCT. 25C UMHO/CM AT 25 C	CARBON DISOLVED INORGAN. MG/L AS C	CARBON DISOLVED ORGANIC MG/L AS C	NH3-N TOTAL FIL.REAC MG/L AS N	NO2+NO3N FIL.REAC MG/L AS N	NO2-N FIL.REAC MG/L AS N
850117	1150	2CP3	20	1.79	5.2	6.7	826.0	58.0	5.2	1.300	1.820	0.0545
850130	1145	3CP3	20		2.1	1.9	755.0	61.0	4.5	1.120	1.860	0.0240
850220	1135	4CP3	20	1.26	2.1	1.9	895.0	60.0	4.1	1.140	1.800	0.0205
850327	1255	5CP3	20	1.01	3.7	3.2	564.0	45.0	4.4	0.242	1.160	0.0210
850417	1140	6CP3	20	1.70	15.1	5.9	558.0	48.0	5.9	0.080	0.865	0.0535
		MAXIMUM		1.79	15.1	6.7	895.0	61.0	5.9	1.300	1.860	0.0545
		ARITH MEAN		1.44	5.6	3.9	719.6	54.4	4.8	0.776	1.501	0.0347
		GEOM MEAN		1.40	4.2	3.4	706.2	54.0	4.8	0.503	1.436	0.0313
		MINIMUM		1.01	2.1	1.9	558.0	45.0	4.1	0.080	0.865	0.0205
		STD DEV (GEOM *)		0.37	5.4	2.3	153.0	7.4	0.7	0.569	0.458	0.0177
		# SAMP IN STATISTICS		4	5	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)										

TEST-NAME:			NNTKUR	PH	PP04FR	PPUT	RSP	RST	TURB
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	K'DAHL N TOTAL FIL.TOT. MG/L AS N	PH	PO4 FIL.REAC MG/L AS P	PHOSPHOR UNF.TOT. MG/L AS P	RESIDUE PARTIC. MG/L	RESIDUE TOTAL MG/L	TURB'ITY FTU
850117	1150	2CP3	1.800	8.13	0.1300	0.147	6.684	524.8	5.80
850130	1145	3CP3	1.530	8.34	0.1180	0.138	5.704	453.8	8.30
850220	1135	4CP3	1.340	8.29	0.1060	0.113	5.888	560.0	5.10
850327	1255	5CP3	0.680	8.31	0.0180	0.048	22.500	362.6	19.50
850417	1140	6CP3	0.570	8.38	0.0400	0.075	16.100	378.2	3.70
		MAXIMUM	1.800	8.38	0.1300	0.147	22.500	560.0	19.50
		ARITH MEAN	1.184	8.29	0.0824	0.104	11.375	455.9	8.48
		GEOM MEAN	1.074	8.29	0.0651	0.096	9.595	449.2	7.07
		MINIMUM	0.570	8.13	0.0180	0.048	5.704	362.6	3.70
		STD DEV (GEOM *)	0.537	0.10	0.0501	0.042	7.589	87.1	6.38
		# SAMP IN STATISTICS	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)							

Table : 21 (cont'd)

Water Chemistry Data Summary
for Cootes Paradise, Winter 1984/85

Station : CP-4 Desjardins Canal Downstream Spencer Creek

TEST-NAME:		FGPROJ	BOD5	CHLRAT	CHLRBT	COND25	DIC	DOC	NNHTFR	NNOTFR	NNO2FR
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	PROJECT SUB-PROJ CODE	BOD 5 DAY TOT.DEM. MG/L AS O	CHLORO-A TOTAL UG/L	CHLORO-B TOTAL UG/L	CONDUCT. 25C UMHO/CM AT 25 C	CARBON DISOLVED INORGAN. MG/L AS C	CARBON DISOLVED ORGANIC MG/L AS C	NH3-N TOTAL FIL.REAC MG/L AS N	NO2+NO3N FIL.REAC MG/L AS N	NO2-N FIL.REAC MG/L AS N
850117	1205	2CP4	20	2.54	8.1	12.5	835.0	60.0	5.0	0.658	1.710	0.0145
850130	1215	3CP4	20		2.6	3.0	730.0	58.0	4.3	0.424	1.690	0.0125
850220	1150	4CP4	20	1.25	2.1	2.1	850.0	60.0	3.8	0.474	1.710	0.0120
850327	1240	5CP4	20	0.51	4.2	4.3	551.0	45.0	4.3	0.018	1.210	0.0150
850417	1100	6CP4	20	1.51	8.1	3.0	556.0	47.0	6.1	0.046	0.880	0.0475
		MAXIMUM		2.54	8.1	12.5	850.0	60.0	6.1	0.658	1.710	0.0475
		ARITH MEAN		1.45	5.0	5.0	704.4	54.0	4.7	0.324	1.440	0.0203
		GEOM MEAN		1.25	4.3	4.0	692.0	53.6	4.6	0.161	1.394	0.0173
		MINIMUM		0.51	2.1	2.1	551.0	45.0	3.8	0.018	0.880	0.0120
		STD DEV (GEOM *)		0.84	2.9	4.3	145.3	7.4	0.9	0.281	0.379	0.0153
		# SAMP IN STATISTICS		4	5	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)										

TEST-NAME:		NNTKUR	PH	PP04FR	PPUT	RSP	RST	TURB
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	K'DAHL N TOTAL FIL.TOT. MG/L AS N	PH	PO4 FIL.REAC MG/L AS P	PHOSPHOR UNF.TOT. MG/L AS P	RESIDUE PARTIC. MG/L	RESIDUE TOTAL MG/L	TURB'ITY FTU
850117	1205	2CP4	1.160	8.17	0.1230	0.139	6.776	550.8	6.60
850130	1215	3CP4	0.770	8.38	0.0900	0.101	3.024	449.0	4.20
850220	1150	4CP4	0.670	8.33	0.0865	0.095	5.107	537.2	4.90
850327	1240	5CP4	0.480	8.39	0.0135	0.047	23.690	363.8	15.80
850417	1100	6CP4	0.610	8.41	0.0355	0.081	12.380	380.4	5.80
		MAXIMUM	1.160	8.41	0.1230	0.139	23.690	550.8	15.80
		ARITH MEAN	0.738	8.34	0.0697	0.093	10.195	456.2	7.46
		GEOM MEAN	0.706	8.34	0.0540	0.087	7.896	449.7	6.59
		MINIMUM	0.480	8.17	0.0135	0.047	3.024	363.8	4.20
		STD DEV (GEOM *)	0.258	0.10	0.0443	0.033	8.305	86.4	4.75
		# SAMP IN STATISTICS	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)							

Table : 21 (cont'd)

Water Chemistry Data Summary
for Cootes Paradise, Winter 1984/85

Station : CP-5 North Channel Upstream Hopkins Cr.

TEST-NAME:			FGPROJ	BOD5	CHLRAT	CHLRBT	COND25	DIC	DOC	NNHTFR	NNOTFR	NNO2FR
				BOD 5 DAY			CONDUCT.	CARBON DISOLVED	CARBON DISOLVED	NH3-N TOTAL	NO2+NO3N	NO2-N
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	PROJECT SUB-PROJ CODE	TOT.DEM. MG/L AS O	CHLORO-A TOTAL UG/L	CHLORO-B TOTAL UG/L	25C UMHO/CM AT 25 C	INORGAN. MG/L AS C	ORGANIC MG/L AS C	FIL.REAC MG/L AS N	FIL.REAC MG/L AS N	FIL.REAC MG/L AS N
850117	1230	2CP5	20	3.03	16.1	6.2	1063.0	53.0	6.2	13.100	3.180	0.7650
850130	1240	3CP5	20		2.6	1.9	1160.0	48.0	7.3	16.100	2.820	0.2700
850220	1300	4CP5	20	3.11	6.8	4.2	1390.0	47.0	6.5	12.000	2.450	0.2170
850327	1205	5CP5	20	4.84			1099.0	52.0	5.4	8.300	1.670	0.1270
850417	1105	6CP5	20	3.25	19.5	2.8	621.0	49.0	5.6	0.554	0.960	0.0640
		MAXIMUM		4.84	19.5	6.2	1390.0	53.0	7.3	16.100	3.180	0.7650
		ARITH MEAN		3.56	11.2	3.8	1066.6	49.8	6.2	10.011	2.216	0.2886
		GEOM MEAN		3.49	8.6	3.4	1031.9	49.7	6.2	6.504	2.039	0.2053
		MINIMUM		3.03	2.6	1.9	621.0	47.0	5.4	0.554	0.960	0.0640
		STD DEV (GEOM *)		0.86	7.9	1.9	279.7	2.6	0.8	5.978	0.898	0.2779
		# SAMP IN STATISTICS		4	4	4	5	5	5	5	5	5
		% SAMP (EXCLUDED)										

TEST-NAME:			NNTKUR	PH	PPO4FR	PPUT	RSP	RST	TURB
			K'DAHL N TOTAL		PO4	PHOSPHOR			
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	FIL.TOT. MG/L AS N	PH	FIL.REAC MG/L AS P	UNF.TOT. MG/L AS P	RESIDUE PARTIC. MG/L	RESIDUE TOTAL MG/L	TURB'ITY FTU
850117	1230	2CP5	14.800	7.80	0.2450	0.355	4.276	624.4	4.30
850130	1240	3CP5	20.000	7.86	0.9630	1.000	6.388	612.4	3.60
850220	1300	4CP5	16.500	7.75	0.1870	0.500	8.024	744.0	7.50
850327	1205	5CP5	4.000	7.98	0.1300	0.405	22.350	646.4	16.80
850417	1105	6CP5	1.170	8.30	0.0390	0.108	20.070	420.2	8.30
		MAXIMUM	20.000	8.30	0.9630	1.000	22.350	744.0	16.80
		ARITH MEAN	11.294	7.94	0.3128	0.474	12.222	609.5	8.10
		GEOM MEAN	7.444	7.94	0.1862	0.378	9.966	599.2	6.95
		MINIMUM	1.170	7.75	0.0390	0.108	4.276	420.2	3.60
		STD DEV (GEOM *)	8.229	0.22	0.3713	0.328	8.351	117.8	5.26
		# SAMP IN STATISTICS	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)							

Table : 21 (cont'd)

Water Chemistry Data Summary
for Cootes Paradise, Winter 1984/85

Station : CP-6 West Pond

TEST-NAME:			FGPROJ	BOD5	CHLRAT	CHLRBT	COND25	DIC	DOC	NNHTFR	NNOTFR	NNO2FR
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	PROJECT SUB-PROJ CODE	BOD 5 DAY TOT.DEM. MG/L AS O	CHLORO-A TOTAL UG/L	CHLORO-B TOTAL UG/L	CONDUCT. 25C UMHO/CM AT 25 C	CARBON DISOLVED INORGAN. MG/L AS C	CARBON DISOLVED ORGANIC MG/L AS C	NH3-N TOTAL FIL.REAC MG/L AS N	NO2+NO3N FIL.REAC MG/L AS N	NO2-N FIL.REAC MG/L AS N
850117	1310	2CP6	20	3.17	6.1	5.3	1036.0	50.0	6.0	13.100	3.140	0.7150
850130	1250	3CP6	20		2.0	1.6	1150.0	52.0	7.4	16.100	2.780	0.2530
850220	1320	4CP6	20	2.44	13.9	6.3	1380.0	73.0	7.5	16.100	0.380	0.0395
850327	1155	5CP6	20	4.11			1103.0	57.0	5.5	7.840	1.610	0.1220
850417	1110	6CP6	20	12.74	84.4	12.5	930.0	56.0	5.7	4.820	1.740	0.1060
		MAXIMUM		12.74	84.4	12.5	1380.0	73.0	7.5	16.100	3.140	0.7150
		ARITH MEAN		5.61	26.6	6.4	1119.8	57.6	6.4	11.592	1.930	0.2471
		GEOM MEAN		4.49	10.9	5.1	1110.2	57.1	6.4	10.511	1.562	0.1560
		MINIMUM		2.44	2.0	1.6	930.0	50.0	5.5	4.820	0.380	0.0395
		STD DEV (GEOM *)		4.80	38.8	4.5	167.3	9.1	1.0	5.071	1.087	0.2728
		# SAMP IN STATISTICS		4	4	4	5	5	5	5	5	5
		% SAMP (EXCLUDED)										

TEST-NAME:			NNTKUR	PH	PPO4FR	PPUT	RSP	RST	TURB
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	K'DAHL N TOTAL FIL.TOT. MG/L AS N	PH	PO4 FIL.REAC MG/L AS P	PHOSPHOR UNF.TOT. MG/L AS P	RESIDUE PARTIC. MG/L	RESIDUE TOTAL MG/L	TURB'ITY FTU
850117	1310	2CP6	16.300	7.76	0.2100	0.398	10.120	606.2	6.50
850130	1250	3CP6	17.300	7.83	0.8910	0.940	4.028	642.0	3.60
850220	1320	4CP6	18.400	8.02	0.1150	0.169	6.356	812.4	3.50
850327	1155	5CP6	8.300	8.05	0.1450	0.250	9.820	651.8	7.20
850417	1110	6CP6	7.300	7.97	0.0740	0.660	133.300	699.4	43.00
		MAXIMUM	18.400	8.05	0.8910	0.940	133.300	812.4	43.00
		ARITH MEAN	13.520	7.93	0.2870	0.483	32.725	682.4	12.76
		GEOM MEAN	12.574	7.93	0.1874	0.401	12.767	678.8	7.60
		MINIMUM	7.300	7.76	0.0740	0.169	4.028	606.2	3.50
		STD DEV (GEOM *)	5.286	0.13	0.3413	0.316	56.280	79.9	16.99
		# SAMP IN STATISTICS	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)							

Table : 21 (cont'd)

Water Chemistry Data Summary
for Cootes Paradise, Winter 1984/85

Station : CP-7 Desjardins Canal Downstream Dredging / Upstream West Pond

TEST-NAME:			FGPROJ	BOD5	CHLRAT	CHLRBT	COND25	DIC	DOC	NNHTFR	NNOTFR	NNO2FR
				BOD 5 DAY			CONDUCT.	CARBON	CARBON	NH3-N TOTAL	NO2+NO3N	NO2-N
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	PROJECT SUB-PROJ CODE	TOT.DEM. MG/L AS O	CHLORO-A TOTAL UG/L	CHLORO-B TOTAL UG/L	25C UMHO/CM AT 25 C	DISOLVED INORGAN. MG/L AS C	DISOLVED ORGANIC MG/L AS C	FIL.REAC MG/L AS N	FIL.REAC MG/L AS N	FIL.REAC MG/L AS N
850117	1300	2CP7	20	2.98	5.4	9.4	1058.0	49.0	6.2	13.500	3.310	0.8980
850130	1310	3CP7	20		2.4	3.9	1085.0	48.0	7.5	16.200	2.910	0.3080
850220	1405	4CP7	20	3.77	1.7	1.9	1215.0	41.0	6.5	12.200	2.590	0.9240
850327	1145	5CP7	20	4.72	6.9	4.0	1169.0	53.0	5.7	11.500	1.960	0.1520
850417	1120	6CP7	20	7.62	23.4	4.4	1032.0	55.0	6.0	12.900	1.820	0.1960
		MAXIMUM		7.62	23.4	9.4	1215.0	55.0	7.5	16.200	3.310	0.9240
		ARITH MEAN		4.77	8.0	4.7	1111.8	49.2	6.4	13.260	2.518	0.4956
		GEOM MEAN		4.48	5.1	4.1	1109.7	49.0	6.4	13.167	2.454	0.3770
		MINIMUM		2.98	1.7	1.9	1032.0	41.0	5.7	11.500	1.820	0.1520
		STD DEV (GEOM *)		2.03	8.9	2.8	77.3	5.4	0.7	1.806	0.629	0.3836
		# SAMP IN STATISTICS		4	5	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)										

TEST-NAME:			NNTKUR	PH	PP04FR	PPUT	RSP	RST	TURB
			K'DAHL N TOTAL		PO4	PHOSPHOR			
SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	FIL.TOT. MG/L AS N	PH	FIL.REAC MG/L AS P	UNF.TOT. MG/L AS P	RESIDUE PARTIC. MG/L	RESIDUE TOTAL MG/L	TURB'ITY FTU
850117	1300	2CP7	17.000	7.77	0.3030	0.408	4.304	636.4	5.60
850130	1310	3CP7	17.600	7.94	0.9240	1.060	6.540	604.6	4.80
850220	1405	4CP7	16.500	8.12	0.2480	0.410	6.148	646.2	8.20
850327	1145	5CP7	11.200	7.90	0.2330	0.305	8.996	667.0	6.90
850417	1120	6CP7	13.200	7.90	0.1900	0.600	13.420	587.4	1.80
		MAXIMUM	17.600	8.12	0.9240	1.060	13.420	667.0	8.20
		ARITH MEAN	15.100	7.93	0.3796	0.557	7.882	628.3	5.46
		GEOM MEAN	14.882	7.93	0.3144	0.504	7.311	627.7	4.87
		MINIMUM	11.200	7.77	0.1900	0.305	4.304	587.4	1.80
		STD DEV (GEOM *)	2.768	0.13	0.3070	0.301	3.519	32.1	2.42
		# SAMP IN STATISTICS	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)							

Table : 21 (cont'd)

Water Chemistry Data Summary
for Cootes Paradise, Winter 1984/85

Station : CP-8 Desjardins Canal at Olympic Drive

SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	NNHTFR NH3-N TOTAL FIL.REAC MG/L AS N	NNOTFR NO2+NO3N FIL.REAC MG/L AS N	BOD5 BOD 5 DAY TOT.DEM. MG/L AS O	CHLRAT CHLORO-A TOTAL UG/L	CHLRBT CHLORO-B TOTAL UG/L	DIC CARBON DISOLVED INORGAN. MG/L AS C	DOC CARBON DISOLVED ORGANIC MG/L AS C	COND25 CONDUCT. 25C UMHO/CM AT 25 C
850117	1355	2CP8	13.800	3.300	3.59	1.3	2.1	49.0	6.5	1029.0
850130	1330	3CP8	16.700	2.830		1.8	2.3	46.0	7.6	1037.0
850220	1425	4CP8	12.100	2.670	4.75	1.9	2.6	41.0	7.3	1210.0
850327	1400	5CP8	10.700	2.200	5.02			54.0	5.5	1155.0
850417	1300	6CP8	10.300	1.710	9.68	19.8	7.4	55.0	6.3	1023.0
		MAXIMUM	16.700	3.300	9.68	19.8	7.4	55.0	7.6	1210.0
		ARITH MEAN	12.720	2.542	5.76	6.2	3.6	49.0	6.6	1090.8
		GEOM MEAN	12.518	2.480	5.37	3.1	3.1	48.7	6.6	1088.1
		MINIMUM	10.300	1.710	3.59	1.3	2.1	41.0	5.5	1023.0
		STD DEV (GEOM *)	2.614	0.609	2.69	9.1	2.5	5.8	0.8	86.1
		# SAMP IN STATISTICS	5	5	4	4	4	5	5	5

SAMPLE DATE YYMMDD	HOUR LMT	SAMPLE NUMBER	NNO2FR NO2-N FIL.REAC MG/L AS N	NNTKUR K'DAHL N TOTAL FIL.TOT. MG/L AS N	PH PH	RST RESIDUE TOTAL MG/L	PPO4FR PO4 FIL.REAC MG/L AS P	PPUT PHOSPHOR UNF.TOT. MG/L AS P	TURB TURB'ITY FTU	RSP RESIDUE PARTIC. MG/L
850117	1355	2CP8	0.9250	16.000	7.83	611.4	0.3200	0.450	2.20	3.332
850130	1330	3CP8	0.2750	18.100	7.89	554.2	0.7700	0.870	3.50	4.108
850220	1425	4CP8	1.5100	15.200	8.16	661.4	0.3740	0.540	7.30	7.308
850327	1400	5CP8	0.1730	11.200	7.71	675.0	0.2350	0.400	8.80	16.940
850417	1300	6CP8	0.2800	10.300	7.73	602.4	0.0815	0.460	1.10	20.310
		MAXIMUM	1.5100	18.100	8.16	675.0	0.7700	0.870	8.80	20.310
		ARITH MEAN	0.6326	14.160	7.86	620.9	0.3561	0.544	4.58	10.400
		GEOM MEAN	0.4507	13.840	7.86	619.3	0.2814	0.522	3.52	8.079
		MINIMUM	0.1730	10.300	7.71	554.2	0.0815	0.400	1.10	3.332
		STD DEV (GEOM *)	0.5742	3.303	0.18	48.6	0.2564	0.189	3.32	7.747
		# SAMP IN STATISTICS	5	5	5	5	5	5	5	5
		% SAMP (EXCLUDED)								

Table : 21 (cont'd)

Description of Test Codes and Abbreviations :

Test Name	Description	Abrev Description	Unit/Scale
PH	PH (-LOG H+ CONCN)	PH	
PHYV	PHYTOPLANKTON,VOLUMETRIC	PHYTO VOLU-METRIC	MM3/L
PP04FR	PHOSPHATE,FILTERED REACTIVE	P04 FIL.REAC	MILLIGRAM PER LITRE AS PHOSPHORUS
PPUT	PHOSPHORUS,UNFILTERED TOTAL	PHOSPHOR UNF.TOT.	MILLIGRAM PER LITRE AS PHOSPHORUS
RSP	RESIDUE,PARTICULATE	RESIDUE PARTIC.	MILLIGRAM PER LITRE
RST	RESIDUE,TOTAL	RESIDUE TOTAL	MILLIGRAM PER LITRE
TCMF	COLIFORM, TOTAL MF	COLIFORM TOTAL MF	COUNTS PER 100 ML
TCMFBK	COLIFORM, TOTAL M/F BCKGRD	COLIFORM TOTAL MF BCKGRD	COUNTS PER 100 ML
TURB	TURBIDITY	TURB'ITY	FORMAZIN TURBIDITY UNITS
ZNUT	ZINC, UNFILTERED TOTAL	ZINC UNF.TOT.	MILLIGRAM PER LITRE AS ZINC

Remark Code	Description
<	ACTUAL RESULT < THAN REPORTED VALUE
<=>	APPROXIMATE RESULT

Table : 21 (cont'd)

Description of Test Codes and Abbreviations :

Test Name	Description	Abrev Description	Unit/Scale
BOD5	BOD, 5 DAY, TOTAL DEMAND	BOD 5 DAY TOT.DEM.	MILLIGRAM PER LITRE AS OXYGEN
CLIDUR	CHLORIDE, UNFIL.REAC	CHLORIDE UNF.REAC	MILLIGRAM PER LITRE AS CHLORINE
CUUT	COPPER, UNFILTERED TOTAL	COPPER UNF.TOT.	MILLIGRAM PER LITRE AS COPPER
DIC	CARBON, DISSOLVED INORGANIC	CARBON DISOLVED INORGAN.	MILLIGRAM PER LITRE AS CARBON
DO	DISSOLVED OXYGEN	DISOLVED OXYGEN	MILLIGRAM PER LITRE AS OXYGEN
DOC	CARBON, DISSOLVED ORGANIC	CARBON DISOLVED ORGANIC	MILLIGRAM PER LITRE AS CARBON
FSMF	FECAL STREPTOCOCCUS MF	FECAL STREPCUS MF	COUNTS PER 100 ML
FWPH	PH FIELD	PH FIELD	
FWSTRC	STREAM CONDITION	STREAM COND.	
FWTEMP	TEMPERATURE, WATER	WATER TEMP	DEGREES CEL
NNHTFR	AMMONIUM, TOTAL FILTER.REAC	NH3-N TOTAL FIL.REAC	MILLIGRAM PER LITRE AS NITROGEN
NNOTFR	NITRATES TOTAL, FILTER.REAC	NO2+NO3N FIL.REAC	MILLIGRAM PER LITRE AS NITROGEN
NNO2FR	NITRITE, FILTERED REACTIVE	NO2-N FIL.REAC	MILLIGRAM PER LITRE AS NITROGEN
NNTKUR	NITROGEN,TOT.KJELDAHL FIL.TOT	K'DAHL N TOTAL FIL.TOT.	MILLIGRAM PER LITRE AS NITROGEN

Table : 22

Sediment Chemistry Data Summary for Cootes Paradise
From July 1980 Core Samples

Station : CP-1 Outlet from Cootes

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (mg/g)	Arsenic (ug/g)	Aluminum (mg/g)	L.O.I. (%)
0 - 16 cm	190	31	16	0.35	400	22	4.9	14.0	31.10
16 - 26 cm	160	24	13	0.30	280	22	4.0	15.0	43.10
26 - 35 cm	260	27	13	0.30	340	21	4.6	18.0	20.50

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 16 cm	20.0	2.2
16 - 26 cm	40.0	2.2
26 - 35 cm	22.0	1.9

Station : CP-2 Cootes Mid Basin

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (ug/g)	Arsenic (ug/g)	Aluminum (ug/g)	L.O.I. (%)
0 - 12 cm	180	32	38	0.65	650	20	4.5	9.8	4.30
12 - 22 cm	150	30	35	0.70	560	19	3.6	11.0	3.90
22 - 26 cm	150	33	27	0.88	610	21	4.8	12.0	3.70
26 - 40 cm	190	38	28	0.50	700	24	6.4	18.0	9.80

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 12 cm	3.7	2.1
12 - 22 cm	1.5	1.2
22 - 26 cm	1.5	1.3
26 - 40 cm	3.9	1.0

Table : 23

Sediment Chemistry Data Summary for Cootes Paradise
From July 1980 Core Samples

Station : CP-3

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (mg/g)	Arsenic (ug/g)	Aluminum (mg/g)	L.O.I. (%)
0 - 9 cm	150	28	29	0.35	660	18	3.6	9.9	3.30
9 - 19 cm	87	15	19	0.35	480	15	2.5	5.9	1.20
19 - 42 cm	94	28	17	0.30	660	20	4.0	11.0	2.80
42 - 48 cm	130	34	21	0.30	740	25	6.1	14.0	3.50
48 - 56 cm	220	43	37	0.78	800	29	8.0	20.0	5.80
56 - 64 cm	230	38	28	0.95	770	27	7.4	18.0	9.80

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 9 cm	2.50	1.90
9 - 19 cm	0.45	0.66
19 - 42 cm	0.93	1.10
42 - 48 cm	1.20	1.00
48 - 56 cm	2.10	1.10
56 - 64 cm	3.60	1.20

Table : 24

Sediment Chemistry Data Summary for Cootes Paradise
From July 1980 Core Samples

Station : CP-4 Desjardins Canal Downstream Spencer Creek

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (ug/g)	Arsenic (ug/g)	Aluminum (ug/g)	L.O.I. (%)
0 - 3 cm	170	42	40	0.40	800	21	4.4	11.0	5.20
3 - 25 cm	94	17	22	0.40	710	15	2.9	5.5	1.40

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 3 cm	3.10	1.80
3 - 25 cm	0.31	0.44

Station : CP-5 North Channel Upstream Hopkins Cr.

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (ug/g)	Arsenic (ug/g)	Aluminum (ug/g)	L.O.I. (%)
0 - 18 cm	81	26	25	0.30	450	13	2.1	5.1	1.95
18 - 25 cm	89	16	24	0.30	430	13	1.9	5.1	1.60
25 - 30 cm	100	27	28	0.30	550	16	2.4	8.7	2.60
30 - 33 cm	110	29	24	0.30	540	17	2.8	9.4	2.40

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 18 cm	1.00	1.40
18 - 25 cm	0.44	0.86
25 - 30 cm	0.88	1.40
30 - 33 cm	0.98	1.40

Table : 25

Sediment Chemistry Data Summary for Cootes Paradise
From July 1980 Core Samples

Station : CP-6 West Pond

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (mg/g)	Arsenic (ug/g)	Aluminum (mg/g)	L.O.I. (%)
0 - 12 cm	310	97	56	0.90	670	23	7.9	15.0	7.61
12 - 20 cm	340	110	57	1.40	660	24	10.0	14.0	7.80
20 - 33 cm	130	31	21	0.30	700	21	3.4	12.0	3.80
33 - 37 cm	190	38	31	0.65	790	33	8.2	27.0	11.20
37 - 42 cm	210	37	27	0.50	620	29	5.5	26.0	14.60
42 - 48 cm	130	40	13	0.65	400	24	9.1	22.0	36.10

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 12 cm	6.80	4.30
12 - 20 cm	4.00	2.60
20 - 33 cm	1.40	1.70
33 - 37 cm	4.30	1.70
37 - 42 cm	6.60	1.30
42 - 48 cm	15.00	0.94

Table : 26

Sediment Chemistry Data Summary for Cootes Paradise
From July 1980 Core Samples

Station : CP-7 Desjardins Canal Downstream dredging / Upstream West Pond

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (mg/g)	Arsenic (ug/g)	Aluminum (mg/g)	L.O.I. (%)
0 - 20 cm	630	220	110	2.50	610	26	10.0	19.0	14.50
20 - 30 cm	600	280	120	3.30	500	20	9.0	15.0	27.90
30 - 48 cm	880	420	160	4.80	600	25	16.0	16.0	23.00
48 - 56 cm	280	65	39	0.63	580	21	4.6	11.0	6.90
56 - 63 cm	320	56	42	0.88	790	28	6.2	19.0	8.40

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 20 cm	16.00	6.20
20 - 30 cm	8.10	6.30
30 - 48 cm	13.00	7.70
48 - 56 cm	3.10	2.10
56 - 63 cm	3.20	1.90

Table : 27

Sediment Chemistry Data Summary for Cootes Paradise
From July 1980 Core Samples

Station : CP-8 Desjardins Canal at Olympic Drive

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (mg/g)	Arsenic (ug/g)	Aluminum (mg/g)	L.O.I. (%)
0 - 8 cm	440	110	68	1.30	570	20	5.9	14.0	7.90
8 - 16 cm	520	110	82	1.90	710	29	8.8	16.0	8.70
16 - 24 cm	380	44	42	0.90	750	27	5.0	19.0	6.50
24 - 34 cm	430	51	58	0.88	720	29	5.5	21.0	6.20
34 - 48 cm	250	31	50	0.30	860	25	6.8	14.0	4.30
48 - 66 cm	260	34	24	0.30	870	28	4.8	16.0	4.40

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 8 cm	6.80	9.50
8 - 16 cm	4.00	2.70
16 - 24 cm	2.80	3.00
24 - 34 cm	3.00	2.60
34 - 48 cm	1.50	1.20
48 - 66 cm	1.70	1.30

Table : 28

Sediment Chemistry Data Summary for Cootes Paradise
From July 1980 Core Samples

Station : CP-11

Core Depth	Zinc (ug/g)	Copper (ug/g)	Lead (ug/g)	Cadmium (ug/g)	Manganese (ug/g)	Iron (mg/g)	Arsenic (ug/g)	Aluminum (mg/g)	L.O.I. (%)
0 - 18 cm	380	80	160	1.80	540	18	4.8	7.8	3.10
18 - 23 cm	130	28	48	1.00	500	14	2.6	5.4	1.00
23 - 32 cm	310	85	130	1.40	560	19	4.9	8.8	2.80
32 - 39 cm	280	64	66	3.50	530	15	4.5	7.0	1.50
39 - 43 cm	480	170	140	37.00	690	23	7.1	13.0	4.10
43 - 45 cm	78	31	21	1.30	610	16	3.4	8.4	2.50
45 - 49 cm	95	35	22	1.70	560	15	4.5	8.7	3.60
49 - 54 cm	65	27	14	1.40	530	12	2.0	5.8	1.60

Core Depth	TKN (mg/g)	Total Phosphorus (mg/g)
0 - 18 cm	1.10	1.30
18 - 23 cm	0.33	0.65
23 - 32 cm	1.00	1.50
32 - 39 cm	0.81	1.00
39 - 43 cm	1.60	1.40
43 - 45 cm	1.00	0.79
45 - 49 cm	1.40	0.69
49 - 54 cm	0.53	0.70

TABLE NO. 29(i) BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-1	CP-1	CP-1	CP-1	CP-1	CP-2	CP-2	CP-2	CP-2	CP-3
MONTH----->	JULY	MAY	MAY	AUG	MAY	JULY	MAY	AUG	MAY	JULY
YEAR---->	1975	1977	1979	1979	1980	1975	1979	1979	1980	1975
EPHEMEROPTERA										
Caenis	0	0	0	0	0	0	0	0	0	0
ODONATA										
Anisoptera	0	0	0	0	0	0	0	0	0	0
HEMIPTERA										
Corixidae	0	0	0	0	0	0	0	0	0	0
LEPIDOPTERA										
Pyralidae	0	0	0	0	0	0	0	0	0	0
COLEOPTERA										
Stenelmis	0	0	0	0	0	0	0	0	0	0
Dubiraphia	0	0	0	0	0	0	0	0	0	0
Hydraenidae	0	0	0	0	0	0	0	0	0	0
DIPTERA										
Chironomidae	0	0	0	0	0	0	0	0	0	0
Unidentified	0	1	0	0	1	0	4	2	1	0
Procladius	6	15	24	6	3	28	4	26	32	6
Tanypus	0	0	0	0	0	0	0	6	0	0
Chironomus	1	0	4	1	3	9	7	14	10	90
Cryptochironomus	0	0	0	0	0	0	1	2	1	0
Parachironomus	0	1	0	1	1	0	1	1	0	0
Endochironomus	0	0	0	0	1	0	0	0	0	0
Goeldichironomus	0	0	0	0	1	0	0	0	0	0
Glyptotendipes	0	0	0	0	0	0	0	0	0	0
Pseudochironomus	0	0	0	0	3	0	2	0	11	0
Polypedilum	0	0	0	0	0	0	1	0	1	0
Paratendipes	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0	0	0	0
Cricotopus	0	0	0	0	6	0	0	0	1	0
Tribelos	0	0	0	0	0	0	0	0	0	0
Paralauterborniella	0	0	0	0	0	0	0	0	0	0
Einfeldia	0	0	0	0	0	0	0	0	0	0
Dicrotendipes	0	0	0	0	0	0	0	0	0	0
Culicidae	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0
Chaoborus	0	0	0	0	0	0	0	0	0	0
Heleidae	0	0	0	0	0	0	0	0	0	0
Palpomyia tibialis	0	0	0	0	0	0	2	6	4	0
Syrphidae	0	0	0	0	0	0	0	0	0	0
Tubifera	0	0	0	0	0	0	0	0	0	0
AMPHIPODA										
Gammarus	0	0	0	0	0	0	0	0	0	0
Crangonyx	0	0	0	0	2	0	0	0	0	0
ISOPODA										
Asellus	0	0	0	0	3	0	0	0	0	0
HYDRACARINA	0	0	0	0	0	0	0	0	0	0

TABLE NO. 29(i) cont'd BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-1	CP-1	CP-1	CP-1	CP-1	CP-2	CP-2	CP-2	CP-2	CP-3
MONTH------>	JULY	MAY	MAY	AUG	MAY	JULY	MAY	AUG	MAY	JULY
YEAR---->	1975	1977	1979	1979	1980	1975	1979	1979	1980	1975
GASTROPODA										
Physa	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	1	0	0	0	0	0
PELECYPODA										
Pisidium	0	0	0	0	1	0	0	0	0	0
Musculium	0	0	0	0	0	0	0	0	0	0
Sphaerium	0	0	0	0	0	0	0	0	0	0
OLIGOCHAETA										
Peloscolex	0	1	0	0	10	0	0	0	1	0
Aulodrilus	0	0	0	0	0	0	0	3	0	0
Tubifex	0	7	7	13	0	0	3	4	4	0
Limnodrilus sp.	78	65	28	38	43	31	5	17	30	34
L. udekemianus	0	0	0	0	0	0	0	3	0	0
L. cervix	0	7	7	13	0	0	3	4	4	0
L. claparedianus	0	8	4	13	0	0	1	2	2	0
L. hoffmeisteri	0	2	14	0	17	0	4	3	12	0
NEMATODA	1	0	0	0	0	0	0	0	0	0
HIRUDINOIDEA	0	0	0	0	0	0	0	0	0	0
TOTAL ORGANISMS	86	99	80	72	96	68	34	85	110	130
ORGANISMS/m2	3703	4263	3445	3100	4134	2928	1464	3660	4737	5598
TOTAL TAXA	4	4	3	4	13	3	8	7	10	3

TABLE NO. 29(ii) BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-3	CP-3	CP-3	CP-3	CP-4	CP-4	CP-4	CP-4	CP-4	CP-5
MONTH------>	MAY	MAY	AUG	MAY	JULY	MAY	MAY	AUG	MAY	JULY
YEAR---->	1977	1979	1979	1980	1975	1977	1979	1979	1980	1975
EPHEMEROPTERA										
Caenis	0	0	0	0	0	0	0	0	1	0
ODONATA										
Anisoptera	0	0	0	0	0	0	0	0	0	0
HEMIPTERA										
Corixidae	0	0	0	0	0	0	0	0	0	1
LEPIDOPTERA										
Pyralidae	0	1	0	0	0	0	0	0	0	0
COLEOPTERA										
Stenelmis	0	0	0	0	0	1	0	0	0	0
Dubiraphia	3	0	0	0	0	1	0	0	0	0
Hydraenidae	0	1	0	0	0	0	0	0	0	0
DIPTERA										
Chironomidae	0	0	0	0	0	0	0	0	0	0
Unidentified	1	0	3	0	0	1	1	0	3	0
Procladius	0	1	13	0	0	1	0	3	0	2
Tanypus	0	0	0	0	0	1	0	1	0	3
Chironomus	1	1	2	1	130	5	1	7	0	277
Cryptochironomus	0	0	2	2	0	0	0	1	0	0
Parachironomus	1	0	0	0	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0
Goeldichironomus	0	0	0	0	0	0	0	0	1	0
Glyptotendipes	0	0	0	0	0	0	0	0	0	7
Pseudochironomus	0	0	0	1	0	0	0	0	0	0
Polypedilum	3	0	2	12	0	2	2	0	8	0
Paratendipes	45	0	0	5	0	16	1	0	0	0
Tanytarsus	1	3	28	0	0	0	1	3	10	0
Cricotopus	0	0	0	0	0	1	1	0	0	0
Tribelos	1	0	0	2	0	0	0	0	0	0
Paralauterborniella	0	0	0	1	0	0	0	0	0	0
Einfielda	0	0	0	0	0	0	0	0	0	0
Dicrotendipes	0	0	0	0	0	0	0	0	0	0
Culicidae	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0
Chaoborus	0	0	0	0	0	0	0	0	0	0
Heleidae	0	0	0	0	0	0	0	0	0	0
Palpomyia tibialis	0	0	0	0	0	1	0	0	0	0
Syrphidae	0	0	0	0	0	0	0	0	0	0
Tubifera	0	0	0	0	0	0	0	0	0	0
AMPHIPODA										
Gammarus	0	0	0	0	0	2	0	0	0	0
Crangonyx	1	1	1	0	0	14	0	0	0	0
ISOPODA										
Asellus	0	0	0	0	0	2	0	0	0	0
HYDRACARINA	0	0	0	1	0	0	0	0	0	0

TABLE NO. 29(ii) cont'd BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-3	CP-3	CP-3	CP-3	CP-4	CP-4	CP-4	CP-4	CP-4	CP-5
MONTH------>	MAY	MAY	AUG	MAY	JULY	MAY	MAY	AUG	MAY	JULY
YEAR---->	1977	1979	1979	1980	1975	1977	1979	1979	1980	1975
GASTROPODA										
Physa	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0
PELECYPODA										
Pisidium	0	0	0	0	0	0	0	0	0	0
Musculium	0	0	0	0	0	0	0	1	0	0
Sphaerium	0	0	0	0	0	0	0	0	1	0
OLIGOCHAETA										
Peloscolex	0	0	0	0	0	0	0	0	0	0
Aulodrilus	1	0	0	0	0	0	0	0	0	0
Tubifex	0	0	0	0	0	4	2	0	1	0
Limnodrilus sp.	1	2	4	6	58	26	2	7	5	2
L. udekemianus	1	1	0	0	0	1	0	1	0	0
L. cervix	0	1	12	0	0	0	0	0	1	0
L. claparedianus	0	6	4	0	0	0	0	0	1	0
L. hoffmeisteri	1	2	4	2	0	4	0	3	1	0
NEMATODA	1	0	0	0	0	0	0	0	0	0
HIRUDINOIDEA	0	0	0	0	0	0	0	0	0	0
TOTAL ORGANISMS	62	19	75	33	188	82	11	28	31	292
ORGANISMS/m2	2670	818	3230	1421	8095	3531	474	1206	1335	12574
TOTAL TAXA	11	7	7	9	2	14	7	7	7	6

TABLE NO. 29(iii) BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-5	CP-5	CP-5	CP-5	CP-6	CP-6	CP-6	CP-6	CP-7	CP-7
MONTH------>	MAY	MAY	AUG	MAY	JULY	MAY	AUG	MAY	JULY	MAY
YEAR---->	1977	1979	1979	1980	1975	1979	1979	1980	1975	1979
EPHEMEROPTERA										
Caenis	1	0	0	0	0	0	0	0	0	0
ODONATA										
Anisoptera	0	0	0	0	0	0	0	0	0	0
HEMIPTERA										
Corixidae	0	0	0	0	0	0	0	0	0	0
LEPIDOPTERA										
Pyralidae	0	0	0	0	0	0	0	0	0	0
COLEOPTERA										
Stenelmis	0	0	0	0	0	0	0	0	0	0
Dubiraphia	0	2	0	0	0	0	1	0	0	0
Hydraenidae	0	0	0	0	0	0	0	0	0	0
DIPTERA										
Chironomidae	0	0	0	0	0	0	0	0	0	0
Unidentified	5	1	0	1	0	2	0	0	0	0
Procladius	0	0	6	0	6	8	5	2	0	0
Tanypus	2	0	5	0	45	6	2	0	0	3
Chironomus	12	10	1	0	265	1	3	0	0	0
Cryptochironomus	0	0	4	2	0	2	0	0	0	0
Parachironomus	0	0	3	0	0	1	0	0	0	0
Endochironomus	0	0	0	0	0	0	0	0	0	0
Goeldichironomus	0	0	0	0	0	0	0	0	0	0
Glyptotendipes	0	0	0	0	4	0	0	0	0	0
Pseudochironomus	0	0	0	0	0	0	0	0	0	0
Polypedilum	7	4	0	3	0	0	0	0	0	0
Paratendipes	10	4	0	23	0	0	0	0	0	0
Tanytarsus	1	0	2	3	0	1	0	0	0	0
Cricotopus	2	1	0	0	0	0	1	0	0	0
Tribelos	0	0	0	0	0	0	0	0	0	0
Paralauterborniella	0	0	0	2	0	0	0	0	0	0
Einfeldia	0	0	0	0	0	0	0	0	0	0
Dicrotendipes	0	0	0	0	0	0	0	0	0	0
Culicidae	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0	0	0	0	0
Chaoborus	0	0	0	0	0	0	0	0	0	0
Heleidae	0	0	0	0	0	0	0	0	0	0
Palpomyia tibialis	1	0	2	3	0	3	0	5	0	0
Syrphidae	0	0	0	0	0	0	0	0	0	0
Tubifera	0	0	0	0	0	0	0	0	0	0
AMPHIPODA										
Gammarus	0	0	0	0	0	0	0	0	0	0
Crangonyx	0	0	0	0	0	0	0	0	0	0
ISOPODA										
Asellus	0	0	0	1	0	0	0	0	0	0
HYDRACARINA	0	0	0	0	0	0	0	0	0	0

TABLE NO. 29(iii) cont'd BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-5	CP-5	CP-5	CP-5	CP-6	CP-6	CP-6	CP-6	CP-7	CP-7
MONTH------>	MAY	MAY	AUG	MAY	JULY	MAY	AUG	MAY	JULY	MAY
YEAR---->	1977	1979	1979	1980	1975	1979	1979	1980	1975	1979
GASTROPODA										
Physa	0	0	0	0	0	0	1	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0
PELECYPODA										
Pisidium	0	0	0	0	0	0	0	0	0	0
Musculium	0	0	0	0	0	0	0	0	0	0
Sphaerium	0	0	0	0	0	0	0	0	0	0
OLIGOCHAETA										
Peloscolex	0	0	0	0	0	0	0	0	0	0
Aulodrilus	0	0	0	1	0	0	0	0	0	0
Tubifex	16	0	1	1	0	0	0	0	0	0
Limnodrilus sp.	115	3	15	9	7	3	338	30	0	1
L. udekemianus	0	0	0	0	0	0	0	0	0	0
L. cervix	0	0	1	0	0	4	2	5	0	0
L. claparedianus	29	2	1	1	0	3	45	4	0	0
L. hoffmeisteri	38	0	2	4	0	1	21	4	0	1
NEMATODA	0	0	0	0	0	0	0	0	0	0
HIRUDINOIDEA	0	0	0	0	0	0	0	0	0	0
TOTAL ORGANISMS	238	27	42	53	327	34	419	50	0	5
ORGANISMS/m2	10248	1163	1809	2282	14081	1464	18042	2153	0	215
TOTAL TAXA	10	6	9	10	5	8	7	3	0	2

TABLE NO. 29(iv) BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-7	CP-7	CP-8	CP-8	CP-8	CP-8	CP-9	CP-9	CP-9	CP-10
MONTH------>	AUG	MAY	JULY	MAY	AUG	MAY	JULY	AUG	MAY	JULY
YEAR---->	1979	1980	1975	1979	1979	1980	1975	1979	1980	1975
EPHEMEROPTERA										
Caenis	0	0	0	0	0	0	0	0	0	0
ODONATA										
Anisoptera	0	0	0	0	0	0	1	0	0	0
HEMIPTERA										
Corixidae	0	0	0	0	0	0	2	0	0	0
LEPIDOPTERA										
Pyralidae	0	0	0	0	0	1	0	0	0	0
COLEOPTERA										
Stenelmis	0	0	0	0	0	0	0	0	0	0
Dubiraphia	0	0	0	0	0	0	0	0	0	0
Hydraenidae	0	0	0	0	0	0	0	0	0	0
DIPTERA										
Chironomidae	0	0	0	0	0	0	0	0	0	0
Unidentified	0	1	0	0	0	0	0	0	0	0
Procladius	1	2	0	0	1	0	20	1	0	0
Tanypus	1	0	3	0	1	0	35	0	0	0
Chironomus	1	0	0	1	0	1	36	2	0	0
Cryptochironomus	0	1	0	0	1	0	0	0	0	0
Parachironomus	0	0	0	0	2	0	0	0	0	0
Endochironomus	0	0	0	0	1	0	0	0	0	0
Goeldichironomus	0	0	0	0	0	0	0	0	2	0
Glyptotendipes	0	0	12	0	0	0	651	0	0	1
Pseudochironomus	0	0	0	0	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0	0	0	0	0
Paratendipes	0	0	0	0	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0	0	0	0	0
Cricotopus	0	0	0	0	0	0	0	0	0	0
Tribelos	0	2	0	0	0	0	0	0	0	0
Paralauterborniella	0	0	0	0	0	0	0	0	0	0
Einfeldia	0	0	0	0	0	0	0	0	1	0
Dicrotendipes	0	0	0	0	0	0	0	0	1	0
Culicidae	0	0	0	0	0	0	0	0	0	0
Unidentified	0	0	2	0	0	0	0	0	0	0
Chaoborus	0	0	0	0	1	0	0	0	0	0
Heleidae	0	0	0	0	0	0	0	0	0	0
Palpomyia tibialis	0	0	0	0	0	0	1	0	0	0
Syrphidae	0	0	0	0	0	0	0	0	0	0
Tubifera	0	0	2	0	0	0	0	0	0	4
AMPHIPODA										
Gammarus	0	0	0	0	0	0	0	0	0	0
Crangonyx	0	0	0	0	0	0	0	0	0	0
ISOPODA										
Asellus	0	0	0	0	0	0	0	0	0	0
HYDRACARINA	0	0	0	0	0	0	0	0	0	0

TABLE NO. 29(iv) cont'd BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-7	CP-7	CP-8	CP-8	CP-8	CP-8	CP-9	CP-9	CP-9	CP-10
MONTH------>	AUG	MAY	JULY	MAY	AUG	MAY	JULY	AUG	MAY	JULY
YEAR---->	1979	1980	1975	1979	1979	1980	1975	1979	1980	1975
GASTROPODA										
Physa	0	0	0	0	0	0	0	0	0	0
Ferrissia	0	0	0	0	0	0	0	0	0	0
PELECYPODA										
Pisidium	0	0	0	0	0	0	0	0	0	0
Musculium	0	0	0	0	0	0	0	0	0	0
Sphaerium	0	0	0	0	0	0	0	0	0	0
OLIGOCHAETA										
Peloscolex	1	0	0	0	0	0	0	0	0	0
Aulodrilus	0	0	0	0	0	0	0	0	0	0
Tubifex	1	1	0	0	1	11	0	0	14	0
Limnodrilus sp.	9	31	2	1	4	44	199	9	6	0
L. udekemianus	0	0	0	0	0	0	0	0	0	0
L. cervix	4	6	0	1	1	7	0	0	0	0
L. claparedianus	1	3	0	1	4	4	0	1	0	0
L. hoffmeisteri	3	0	0	1	1	4	0	8	4	0
NEMATODA	0	0	0	0	0	0	0	0	0	0
HIRUDINOIDEA	0	0	0	0	0	0	1	0	0	0
TOTAL ORGANISMS	21	46	22	3	17	72	946	20	27	5
ORGANISMS/m2	904	1981	947	129	732	3100	40735	861	1163	215
TOTAL TAXA	6	5	6	2	8	4	9	3	5	2

TABLE NO. 29(v) BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-10	CP-10	CP-11	CP-11	CP-11	CP-11
MONTH------>	AUG	MAY	MAY	MAY	AUG	MAY
YEAR---->	1979	1980	1977	1979	1979	1980
EPHEMEROPTERA						
Caenis	0	0	0	0	0	0
ODONATA						
Anisoptera	0	0	0	0	0	0
HEMIPTERA						
Corixidae	0	0	0	0	0	0
LEPIDOPTERA						
Pyralidae	0	0	0	0	0	0
COLEOPTERA						
Stenelmis	0	0	0	0	0	0
Dubiraphia	0	0	0	0	0	0
Hydraenidae	0	0	0	0	0	0
DIPTERA						
Chironomidae	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0
Procladius	1	0	10	0	0	0
Tanypus	7	0	0	0	0	0
Chironomus	3	0	2	0	1	0
Cryptochironomus	0	0	0	0	0	0
Parachironomus	0	0	0	0	0	0
Endochironomus	0	0	0	0	0	0
Goeldichironomus	0	0	0	0	0	0
Glyptotendipes	0	0	0	0	0	0
Pseudochironomus	0	0	0	0	0	0
Polypedilum	0	0	0	0	0	0
Paratendipes	0	0	0	0	0	0
Tanytarsus	0	0	0	0	0	0
Cricotopus	0	0	0	0	0	0
Tribelos	0	0	0	0	0	0
Paralauterborniella	0	0	0	0	0	0
Einfeldia	0	0	0	0	0	0
Dicrotendipes	0	0	0	0	0	0
Culicidae	0	0	0	0	0	0
Unidentified	0	0	0	0	0	0
Chaoborus	0	0	0	0	0	0
Heleidae	0	0	0	0	0	0
Palpomyia tibialis	0	0	1	0	0	0
Syrphidae	0	0	0	0	0	0
Tubifera	0	0	0	0	0	0
AMPHIPODA						
Gammarus	0	0	0	0	0	0
Crangonyx	0	0	0	0	0	0
ISOPODA						
Asellus	0	0	0	0	0	0
HYDRACARINA	0	0	0	0	0	0

TABLE NO. 29(v) cont'd BENTHIC MACROINVERTEBRATES COLLECTED IN COOTES PARADISE, 1975-1980

STATION NUMBER----->	CP-10	CP-10	CP-11	CP-11	CP-11	CP-11
MONTH------>	AUG	MAY	MAY	MAY	AUG	MAY
YEAR---->	1979	1980	1977	1979	1979	1980
GASTROPODA						
Physa	0	0	0	0	0	0
Ferrissa	0	0	0	0	0	0
PELECYPODA						
Pisidium	0	0	0	0	0	0
Musculium	0	0	0	0	0	0
Sphaerium	0	0	0	0	0	0
OLIGOCHAETA						
Peloscolex	0	0	0	0	0	0
Aulodrilus	0	0	0	0	0	4
Tubifex	185	296	3	1	2	7
Limnodrilus sp.	156	10	53	0	2	68
L. udekemianus	0	0	0	0	0	0
L. cervix	0	0	3	0	0	18
L. claparedianus	0	0	3	0	1	15
L. hoffmeisteri	13	12	3	0	0	14
NEMATODA	1	0	0	0	0	0
HIRUDINOIDEA	0	0	0	0	0	0
TOTAL ORGANISMS	366	317	78	1	6	126
ORGANISMS/m2	15760	13650	3359	43	258	5426
TOTAL TAXA	6	2	5	1	3	3

TABLE 30

COOTES PARADISE ANNUAL MEAN NUTRIENT DATA COMPARING 1975, 1979 and 1980

Station	Year	Total P mg/l as P	Soluble P mg/l as P	Total Kjeldahl N mg/l as N	Total & Unionized* Ammonia mg/l as N		Nitrate mg/l as N	Nitrite mg/l as N	% Change Since 1975 Total P	Total N
CP1	1975	0.330	0.051	2.30	0.46	0.015	0.76	0.108	-	-
	1979	0.24	0.028	2.90	0.776	0.036	1.285	0.153	-27	+37
	1980	0.218	0.025	1.90	0.29	0.008	1.00	0.118	-34	-4.7
CP2	1975	0.400	0.057	2.47	0.34	0.011	0.36	0.086	-	-
	1979	0.287	0.0175	2.62	0.224	0.012	0.288	0.064	-28	+2
	1980	0.209	0.021	1.78	0.14	0.006	0.71	0.085	-48	-11.7
CP3	1975	0.570	0.216	2.53	0.56	0.023	0.50	0.145	-	-
	1979	0.121	0.013	1.16	0.052	0.004	0.515	0.037	-89	-46
	1980	0.170	0.088	1.25	0.145	0.007	0.60	0.046	-70	-40.3
CP4	1975	0.950	0.678	3.68	0.70	0.023	0.77	0.179	-	-
	1979	0.262	0.016	1.79	0.085	0.007	0.79	0.11	-72	-42
	1980	0.181	0.018	1.55	0.27	0.019	1.01	0.101	-81	-42.5
CP5	1975	3.18	2.298	11.23	8.29	0.220	1.58	0.477	-	-
	1979	0.68	0.052	5.66	0.28	0.041	2.83	0.28	-79	-35
	1980	0.173	0.022	1.86	0.495	0.019	1.00	0.22	-95	-76.8
CP6	1975	3.73	2.255	15.41	9.01	0.373	0.58	0.242	-	-
	1979	0.83	0.048	5.56	0.32	0.045	4.14	0.31	-78	-38
	1980	0.495	0.045	3.68	0.69	0.023	3.07	0.432	-87	-55.8
CP7	1975	4.870	3.580	16.73	15.11	0.162	1.48	1.204	-	-
	1979	0.41	0.077	3.65	1.25	0.041	10.27	0.45	-91%	-26
	1980	0.475	0.134	3.98	2.38	0.048	7.15	1.263	-90%	-36.2

TABLE 30 con't

COOTES PARADISE ANNUAL MEAN NUTRIENT DATA COMPARING 1975, 1979 and 1980

Station	Year	Total P mg/l as P	Soluble P mg/l as P	Total Kjeldahl N mg/l as N	Total & Unionized* Ammonia mg/l as N		Nitrate mg/l as N	Nitrite mg/l as N	% Change Since 1975 Total P	Total N
CP8	1975	4.730	3.300	17.22	13.23	0.142	4.79	0.662	-	-
	1979	0.52	0.18	3.46	0.81	0.027	14.03	0.39	-89	-21
	1980	0.525	0.213	3.85	2.99	0.042	7.79	1.342	-89	-42.7
CP9	1975	1.700	0.985	6.21	2.77	0.092	0.57	0.182	-	-
	1979	1.00	0.15	3.36	1.96	0.039	13.52	0.44	*	*
	1980	0.928	0.398	5.00	3.91	0.053	7.91	1.27	*	*
CP10	1975	4.160	2.845	15.85	11.15	0.076	4.41	1.362	-	-
	1979	1.08	0.18	2.69	1.29	0.014	15.14	0.19	-74	-17
	1980	0.928	0.443	6.26	5.04	0.054	7.06	0.946	-78	-34.0
CP11	1975**	0.502	0.234	0.98	0.043	0.003	2.64	0.035	-	-
	1979	0.33	0.012	3.24	0.72	0.019	0.89	0.10	-34	+16
	1980	0.359	0.102	3.14	1.47	0.024	1.77	0.145	-29	+38

* For calculation of unionized ammonia, mean annual pH for that station and overall mean temperature of 18°C were used.

** 1975 data for Chedoke Creek are stated as the weighted mean of stations G1 and G2 (mean = $\frac{G1 + 2(G2)}{3}$, from Appendix I-B in "A Water Quality Study of Cootes Paradise". The flow in G2 was appproximately double than that in G1.

TABLE 31

MEAN CHLOROPHYLL a CONCENTRATIONS IN COOTES PARADISE

Station	1972*	1975	1979	1980
CP1	163**	79	59	49
CP2	160	132	67	49
CP3	-	76	36	37
CP4	-	100	72	39
CP5	135	206	182	27
CP6	695	407	243	145
CP7	-	60	79	46
CP8	-	28	39	28

* From Harris & Bacchus (1974)

** All data are in mg/m^3

TABLE 32

MEAN LEVELS OF SUSPENDED SOLIDS AT STATIONS IN COOTES PARADISE IN 1975, 1979 AND 1980

STATION	1975	1979	1980
CP1	72	104	49
CP2	109	152	57
CP3	128	42	32
CP4	52	61	33
CP5	76	98	37
CP6	67	218	89
CP7	71	34	24
CP8	65	24	23
CP9*	61	45	30
CP10*	49	33	21
CP11	77**	64	40

* The location of CP9 was changed following WPCP expansion so that 1975 data should not be compared with 1979 & 1980 1980 data. While CP10 was also relocated, it remained functionally similar, representing the WPCP discharge.

** Weighted mean of stations G1 and G2 from Appendix I-B (MOE, 1976)

TABLE 33

MEAN ANNUAL BOD_5 CONCENTRATIONS AT STATIONS IN COOTES PARADISE 1975 AND 1980*

STATION	1975	1980
CP1	7.2	4.6
CP2	7,8	4.5
CP3	7.4	3.0
CP4	7.4	2.7
CP5	19.0	2.8
CP6	23.2	7.4
CP7	44.0	6.8
CP8	26.9	6.2
CP9	13.6	7.9
CP10	16.6	5.2
CP11	2.83	5.9

* BOD_5 not analyzed in 1979

TABLE 34

MEAN ANNUAL METALS* LEVELS IN WATER OF COOTES PARADISE 1975, 1979 AND 1980

Fe in mg/l
All Others in ug/l

Station	Year	Fe	Mn	Zn	Pb	Cu	Cd	As
CP1	1975	2.03	180	56	ND	29	ND	5.1
	1979	1.78	162	42	16	9.2	9.8	2
	1980	1.82	170	45	40	13	4	2
CP2	1975	3.38	254	65	ND	22	ND	5.0
	1979	2.52	218	23	16	13	2.9	2.7
	1980	1.96	180	30	30	10	5	2
CP3	1975	4.02	288	42	12	20	ND	3.8
	1979	1.2	145	11	16	10	2.9	1.7
	1980	1.5	160	20	30	10	4	2
CP4	1975	1.54	215	28	ND	12	ND	2.5
	1979	2.01	220	18	17	11	2.9	2.5
	1980	1.24	150	20	30	10	4	2
CP5	1975	1.91	288	40	ND	19	ND	3.3
	1979	2.33	250	23	23	13	5.8	4.2
	1980	1.29	170	20	30	10	4	2
CP6	1975	1.31	212	37	ND	16	ND	4.6
	1979	3.00	270	28	16	20	4.2	4.5
	1980	2.5	260	30	30	10	4	4
CP7	1975	0.87	134	161	14	108	ND	2.2
	1979	0.84	140	14	16	12	2.9	1.9
	1980	0.93	150	20	30	10	5	2

TABLE 34 con't

MEAN ANNUAL METALS* LEVELS IN WATER OF COOTES PARADISE 1975, 1979 AND 1980

Fe in mg/l
All Others in ug/l

Station	Year	Fe	Mn	Zn	Pb	Cu	Cd	As
CP8	1975	1.44	120	112	21	71	ND	1.0
	1979	0.68	120	22	19	14	3.6	2.6
	1980	0.80	130	20	30	10	4	2
CP9	1975	1.54	389	47	14	19	ND	2.3
	1979	1.15	140	50	16	26	3.6	1.6
	1980	0.94	130	30	30	10	4	1
CP10	1975	0.98	107	65	ND	41	ND	0.8
	1979	0.65	110	40	16	24	-	1.4
	1980	0.41	100	30	30	10	4	1
CP11	1975	0.44	70	58.3	ND	5.8	ND	2.4
	1979	2.06	220	38	16	18	-	1.9
	1980	1.76	200	50	30	20	4	2
PWQO's		0.30		30	25*	5	0.2	100

*Fe is Iron; Mn is Manganese; Zn is Zinc; Pb is Lead; Cu is Copper; Cd is Cadmium; and As is Arsenic

*Pb toxicity declines with increasing alkalinity. At alkalinities greater than 80 mg/l as in Cootes Paradise, the Provincial Water Quality Objective (PWQO) is 25 ug/l.

TABLE 35

CONCENTRATIONS OF METALS*' LOI, TKN and TOTAL P IN COOTES PARADISE SEDIMENTS
1975 vs 1980

Fe, Al, Tot. P and TKN in mg/g. LOI in %. All others ug/g

Station	Year	Cu	Zn	Pb	Cd	Mn ug/g	Fe mg/g	Al mg/g	As mg/g	%LOI	Tot. P	TKN
CP1	1975	49	425	76	3.9	664	26.8	13.0	5.7	7.5	1.2	2.4
	1980**	31	190	16	0.35	400	22	14	4.9	31.1	2.2	3.0
CP2	1975	33	184	41	1.0	517	24	11.8	4.3	4.9	1.1	1.4
	1980	32	180	38	0.65	650	20	9.8	4.5	4.3	2.1	3.7
CP3	1975	17	81	19	L1.0	367	15.5	5.1	2.4	2.9	0.8	L0.5
	1980	28	150	29	0.35	660	18	9.9	3.6	3.3	1.9	2.5
CP4	1975	36	128	34	L1.0	504	20.7	8.43	3.9	6.1	1.0	1.3
	1980	42	170	40	0.4	800	21	11	4.4	5.2	1.8	3.1
CP5	1975	31	104	24	L1.0	389	15.0	5.47	2.4	5.1	1.1	1.0
	1980	26	81	25	L0.3	450	13	5.1	2.1	1.95	1.4	1.0
CP6	1975	93	305	51	1.0	540	23.3	9.81	10.0	10	1.7	3.4
	1980	97	310	56	0.9	670	23	15	7.9	7.61	4.3	6.8
CP7	1975	731	1310	287	8.4	376	20.3	10.93	10.3	57	11.5	33.5
	1980	220	630	110	2.5	610	26	19	10	14.5	6.2	16
CP8	1975	891	1470	302	10	307	20.1	9.03	34	52	8.9	33
	1980	110	440	68	1.3	570	20	14	5.9	7.9	9.5	6.8

* Cu is Copper; Zn is Zinc; Pb is Lead; Cd is Cadmium; Mn is Manganese; Fe is Iron; Al is Aluminum; As is Arsenic; %LOI is Percentage Loss On Ignition; Tot. P is Total Phosphorus; and TKN is Total Kjeldahl Nitrogen.

**CPI was relocated in 1980 to the outlet to Hamilton Harbour.

L is Less than.

TABLE 36

N/P ATOMIC RATIOS CALCULATED FROM THE MEAN CONCENTRATIONS OF NITRATE AND SOLUBLE PHOSPHORUS IN COOTES PARADISE, 1975, 1979, 1980

Station	NO_3			Soluble P			N/P		
	1975	1979	1980	1975	1979	1980	1975	1979	1980
CP1	0.76	1.285	1.04	0.051	0.028	0.023	63.9	45.9	45.2
CP2	0.36	0.288	0.720	0.057	0.0175	0.017	19.6	16.5	42.5
CP3	0.50	0.515	0.651	0.216	0.013	0.072	6.0	30.6	9.0
CP4	0.77	0.79	1.103	0.678	0.016	0.017	3.9	49.4	64.9
CP5	1.58	2.83	1.740	2.298	0.052	0.039	6.1	54.4	44.6
CP6	0.58	4.14	3.86	2.255	0.0478	0.064	0.9	86.6	60.3
CP7	1.48	10.27	6.79	3.580	0.0774	0.151	1.2	132.7	45.0
CP8	4.79	14.03	8.42	3.300	0.18	0.227	4.0	79.4	37.1
CP9	0.57	13.52	8.21	0.985	0.15	0.393	3.6	90.1	20.9
CP10	4.41	15.14	7.01	2.845	0.18	0.436	3.4	84.1	16.1
CP11	-	0.89	1.77	-	0.0118	0.102	-	75.4	17.4

TABLE 37

1979 and 1980 MONTHLY MEAN DAILY FLOWS IN THE DUNDAS WPCP

DISCHARGE MEASURED AT CHLORINE CONTACT CHAMBER

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1979	1.98	1.26	1.51	2.68	1.71	1.58	1.53	1.35	1.42	1.28	1.52	2.8
1980	2.4	2.08	2.7	3.4	2.8	2.0	2.0	1.66	1.37	1.19	1.4	1.8

TABLE 38

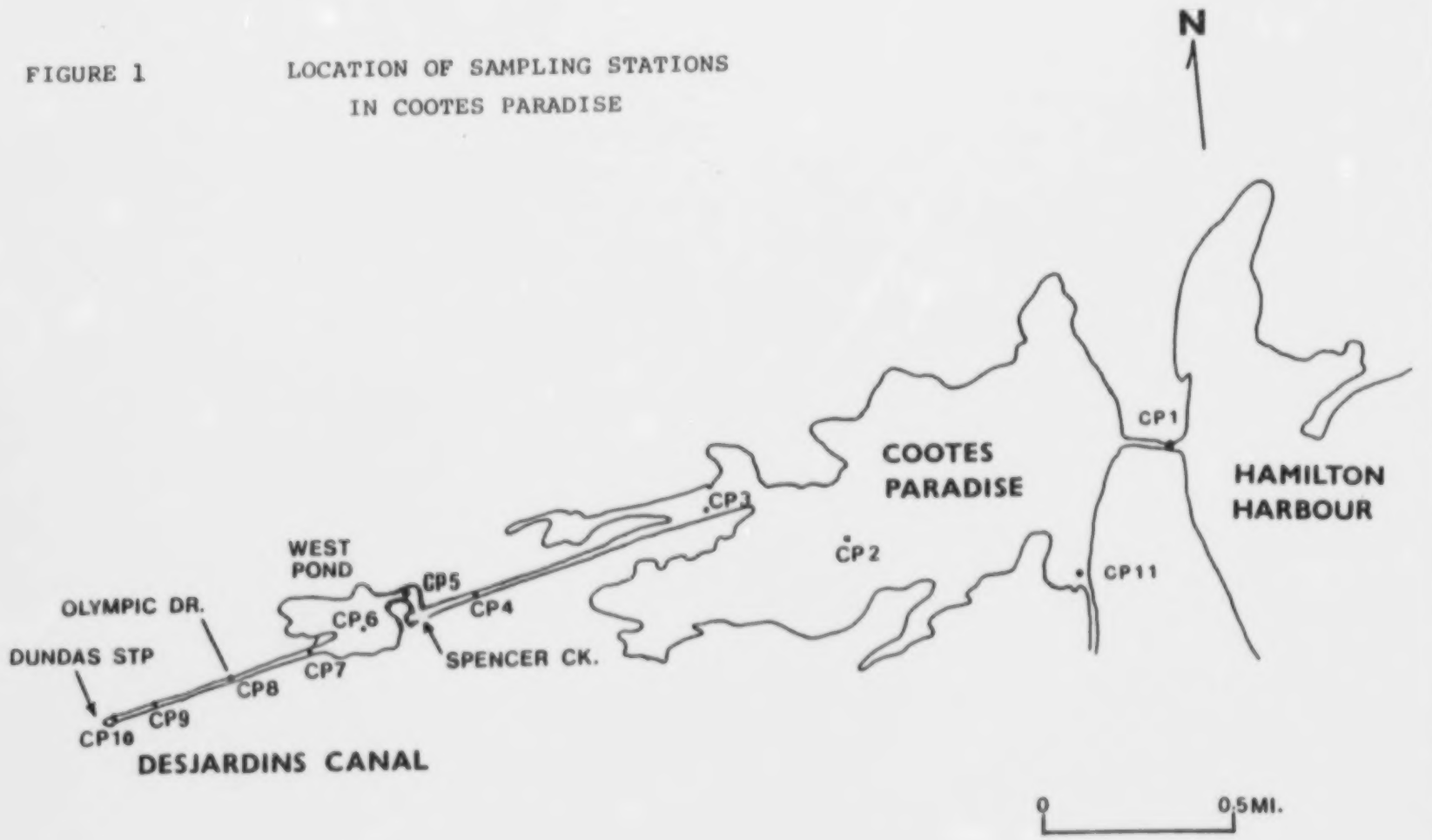
MEAN DAILY LOADINGS (IN LB/DAY) COMPARED TO ALLOWABLE LOADINGS FOR BOD_5, SUSPENDED SOLIDS, TOTAL KJELDAHL NITROGEN AND TOTAL PHOSPORUS FROM THE DUNDAS WPCP TO COOTES PARADISE DURING JUNE TO SEPTEMBER 1979 AND APRIL TO NOVEMBER 1980

Station	Year	WPCP Mean Flow	BOD_5 Conc'n	BOD_5 Loading	Suspended Solids Conc'n	Suspended Solids Loading	TKN Conc'n.	TKN Loading	Total P Conc.	Total P Loading
CP8	1979	1.47	NM	-	24	354	3.46	51	0.52	7.7
	1980	1.98	6.2	123	23	457	3.85	76	0.525	10.4
CP10	1979	1.47	NM	-	33	486	2.69	40	1.08	15.9
	1980	1.98	5.2	103	21	417	6.26	124	0.928	18.4
Allowable load at CP8				200		200		80		20

* Data Provided by the Regional Municipality of Hamilton-Wentworth, measured at the chlorine contact chamber rather than at Olympic Drive.

NM - Not Measured

FIGURE 1 LOCATION OF SAMPLING STATIONS IN COOTES PARADISE



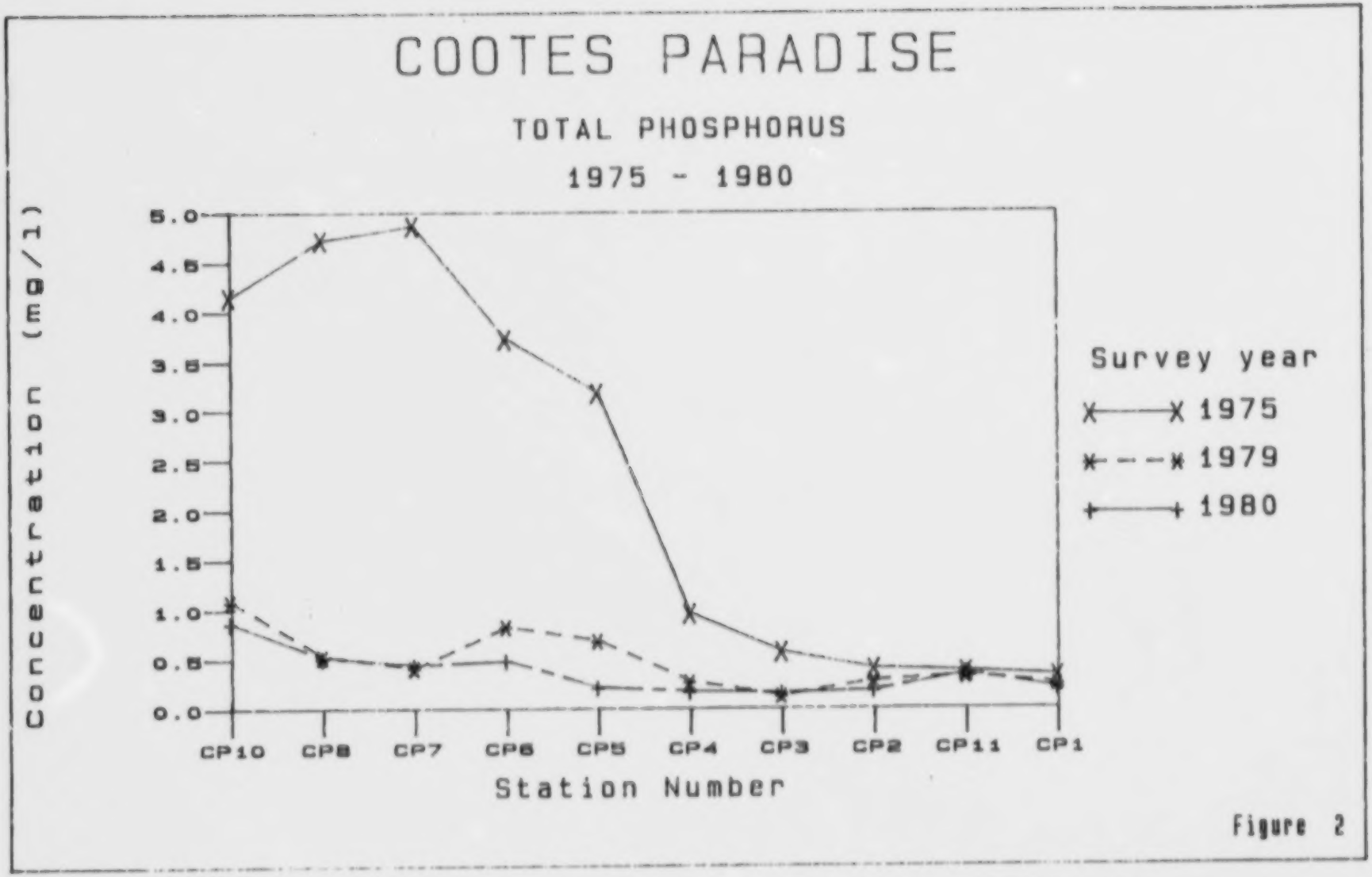

COOTES PARADISE
TOTAL PHOSPHORUS
1975 - 1980
Concentration (mg/l)
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 2

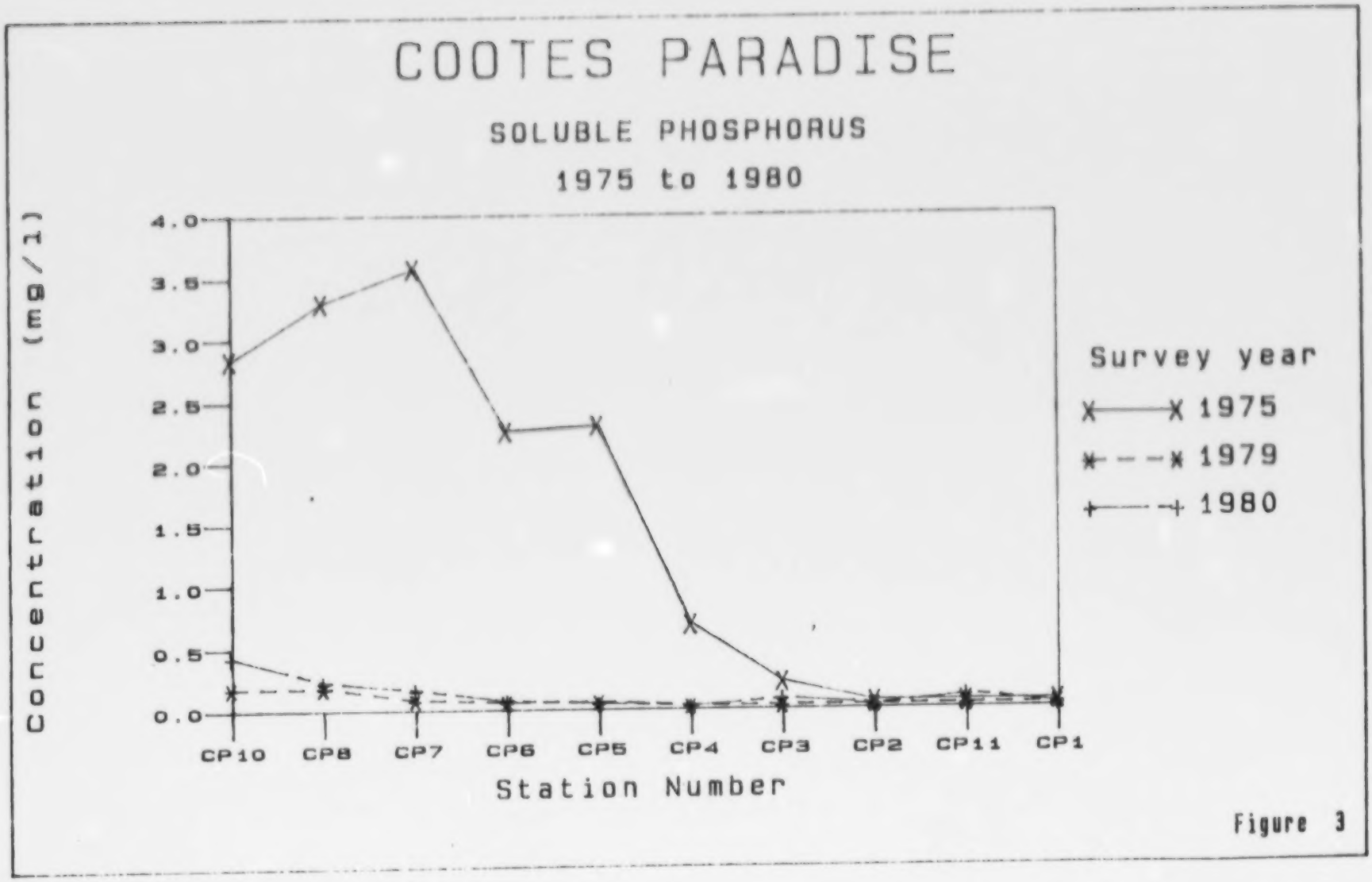

COOTES PARADISE
SOLUBLE PHOSPHORUS
1975 to 1980
Concentration (mg/l)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 3

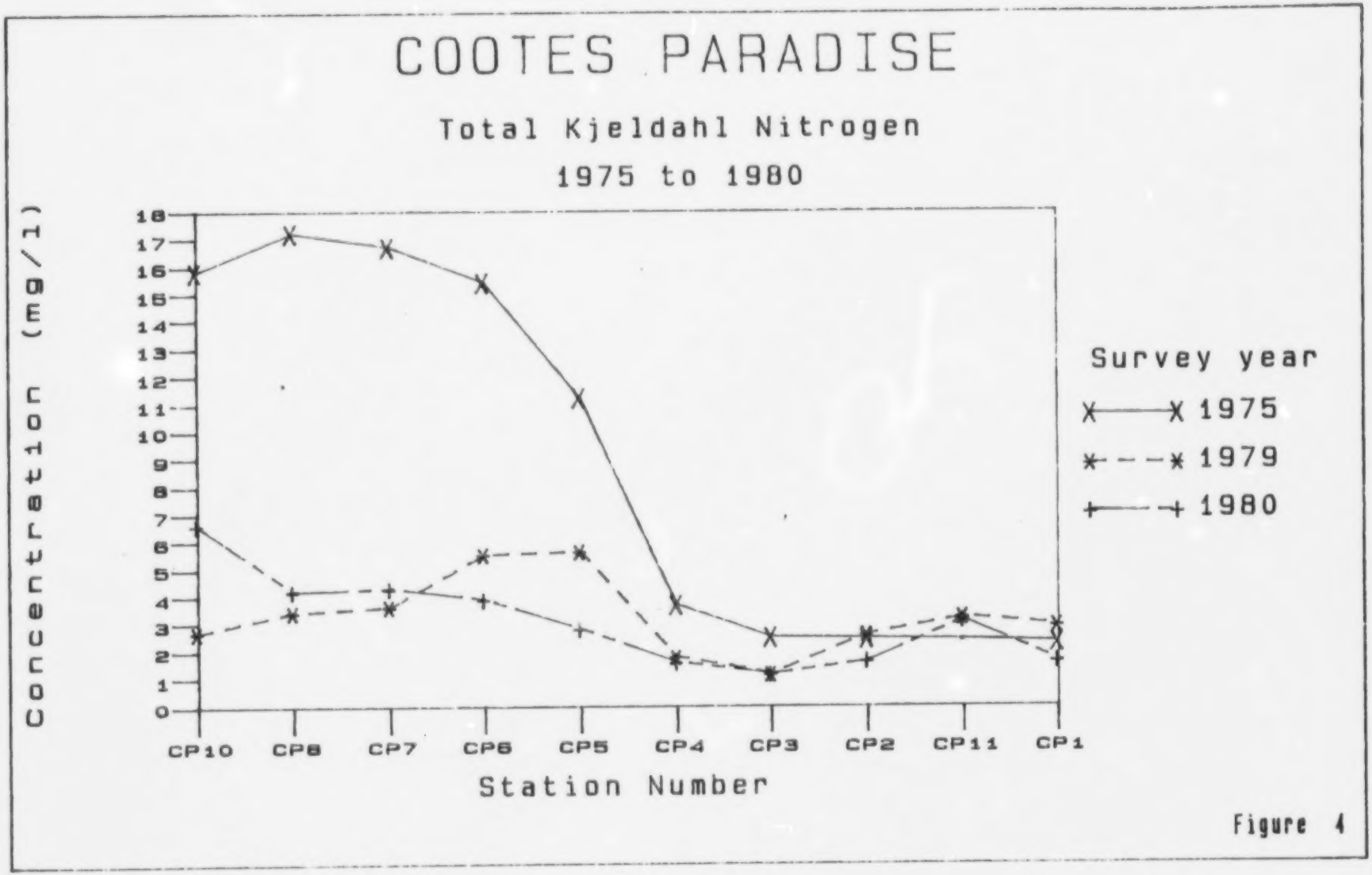

COOTES PARADISE
Total Kjeldahl Nitrogen
1975 to 1980
Concentration (mg/l)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 4

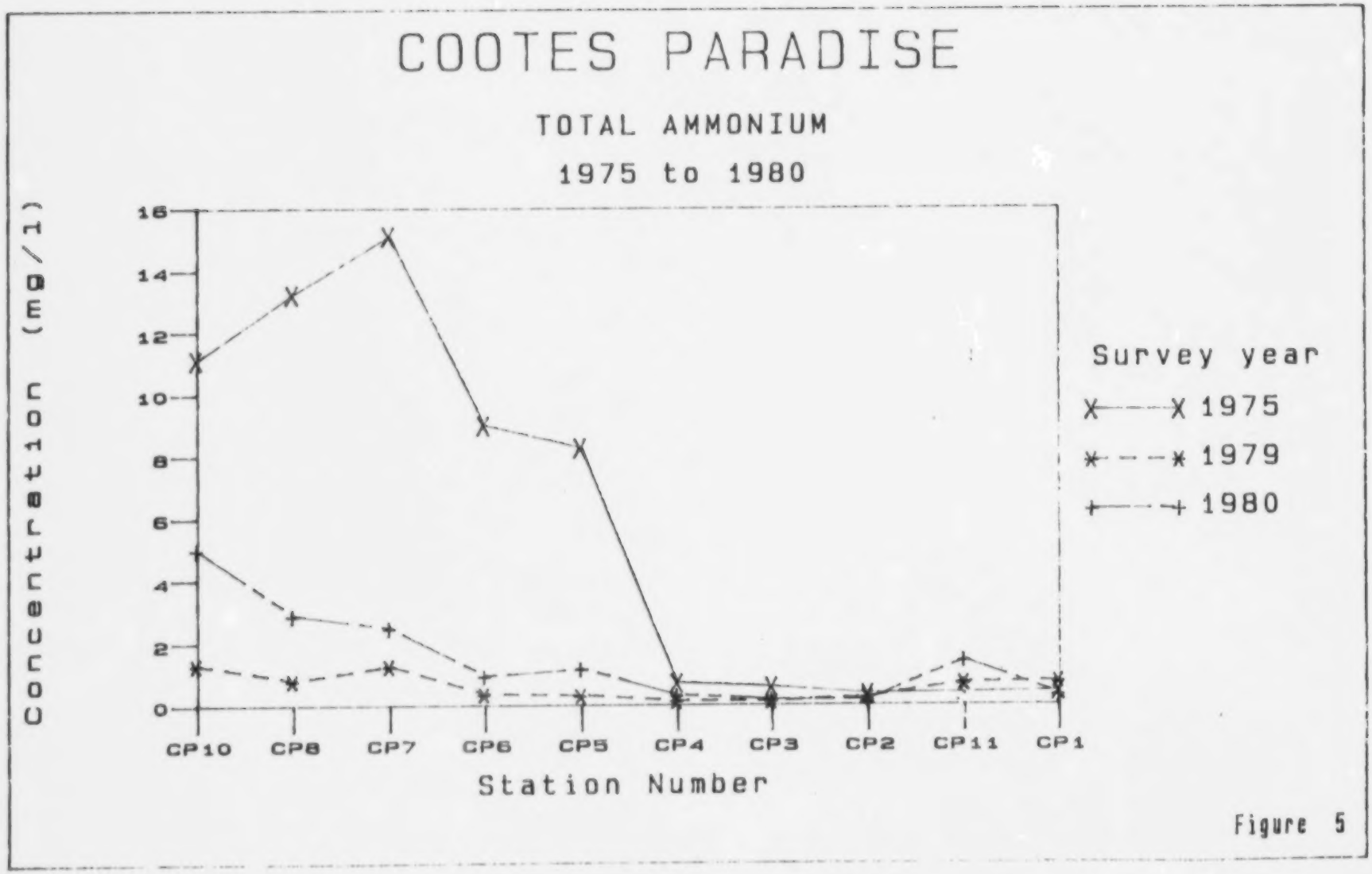

COOTES PARADISE
TOTAL AMMONIUM
1975 to 1980
Concentration (MG/L)
16
14
12
10
8
6
4
2
0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 5

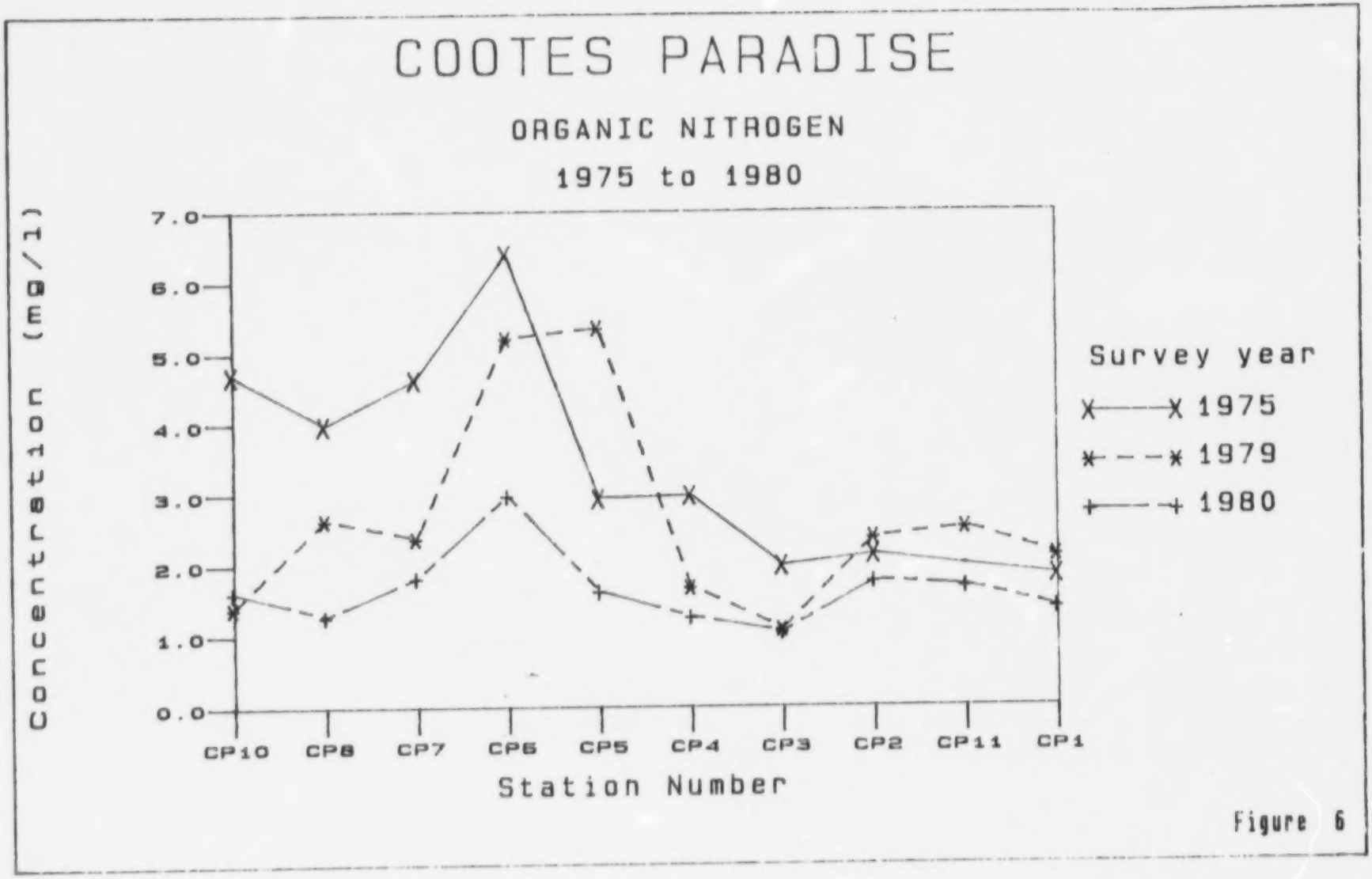

COOTES PARADISE
ORGANIC NITROGEN
1975 to 1980
Concentration (mg/l)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 6

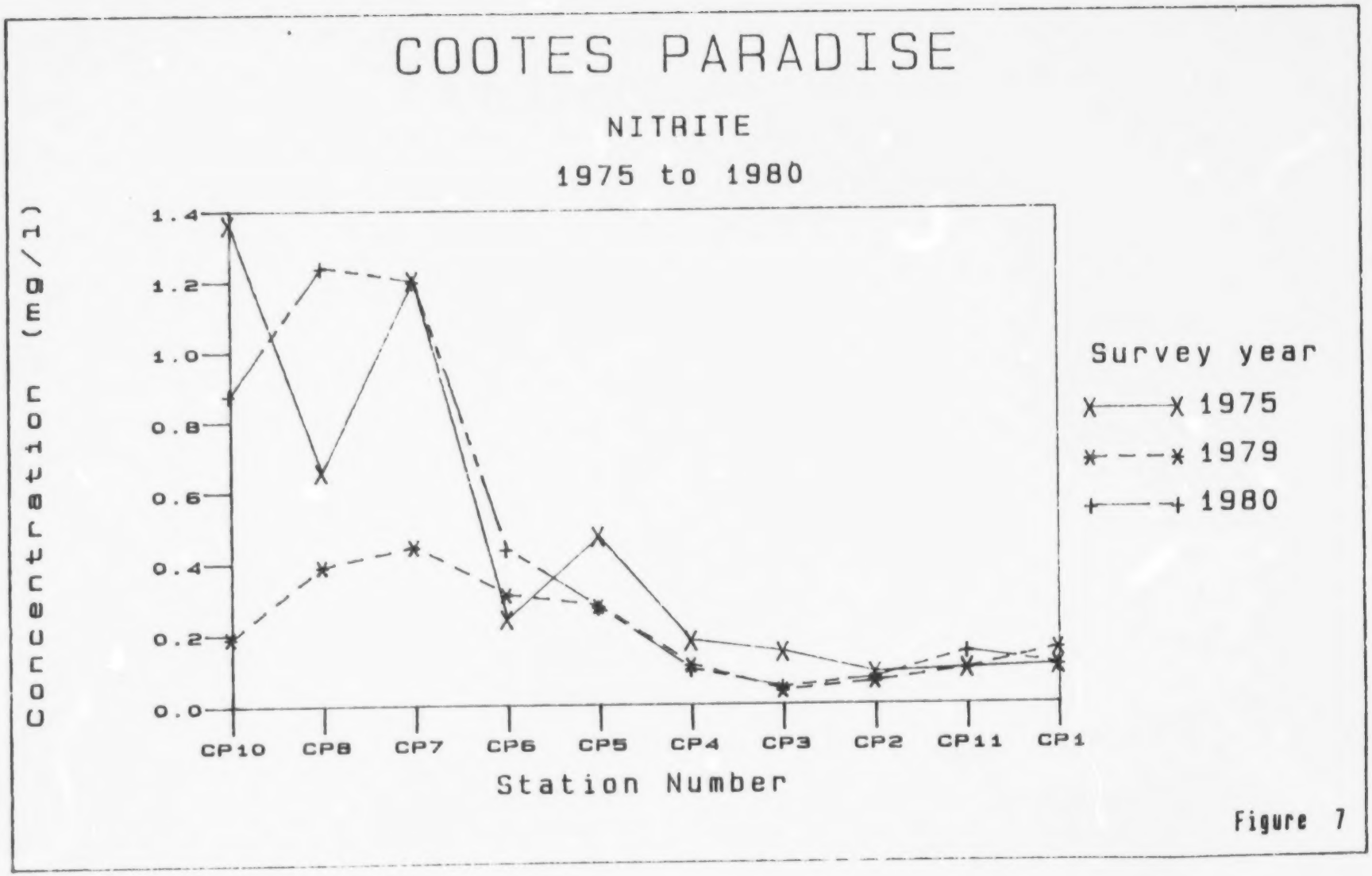

COOTES PARADISE
NITRITE
1975 to 1980
Concentration (mg/l)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 7

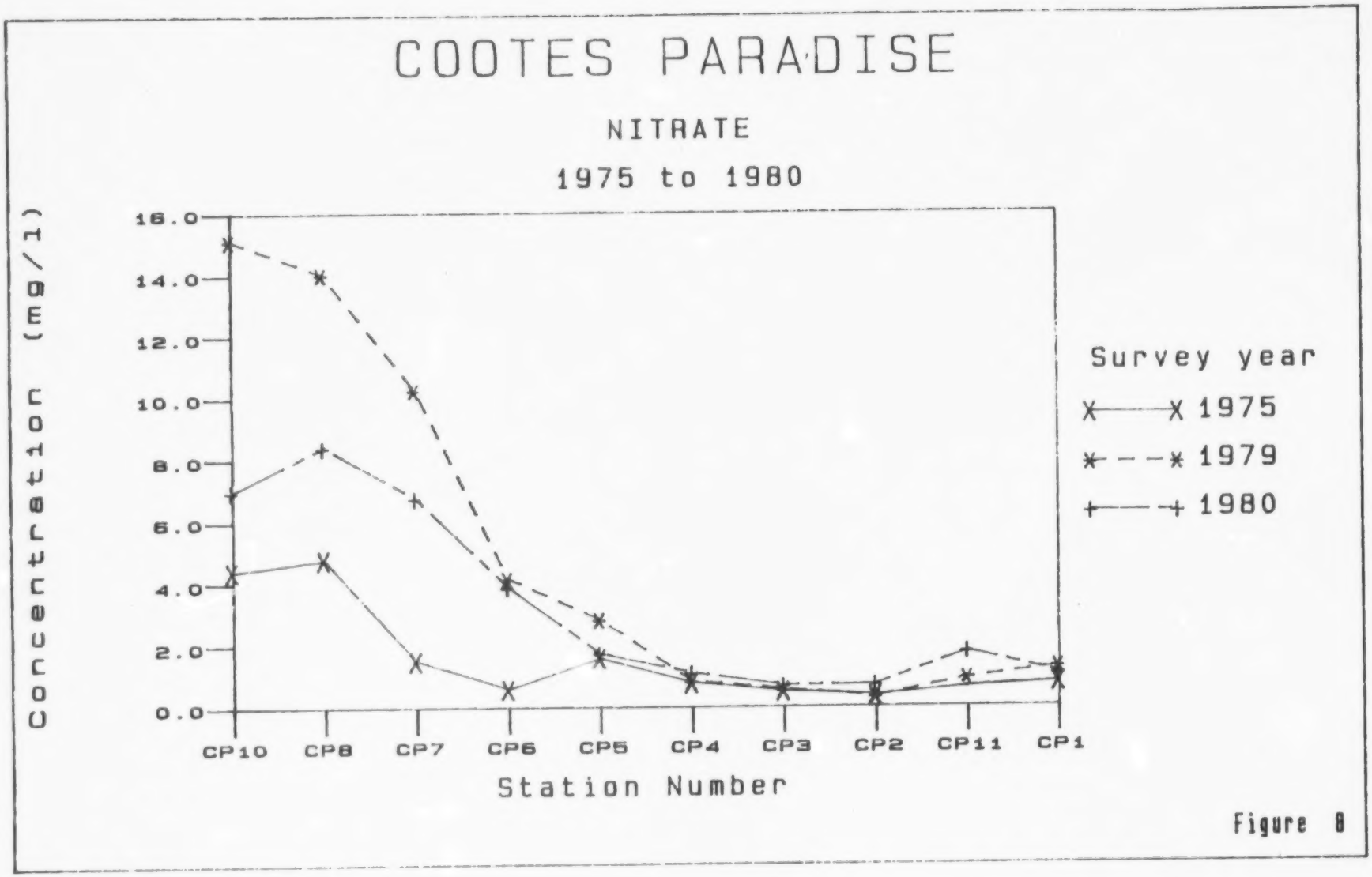

COOTES PARADISE
NITRATE
1975 to 1980
Concentration (mg/l)
16.0
14.0
12.0
10.0
8.0
6.0
4.0
2.0
0.0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 8

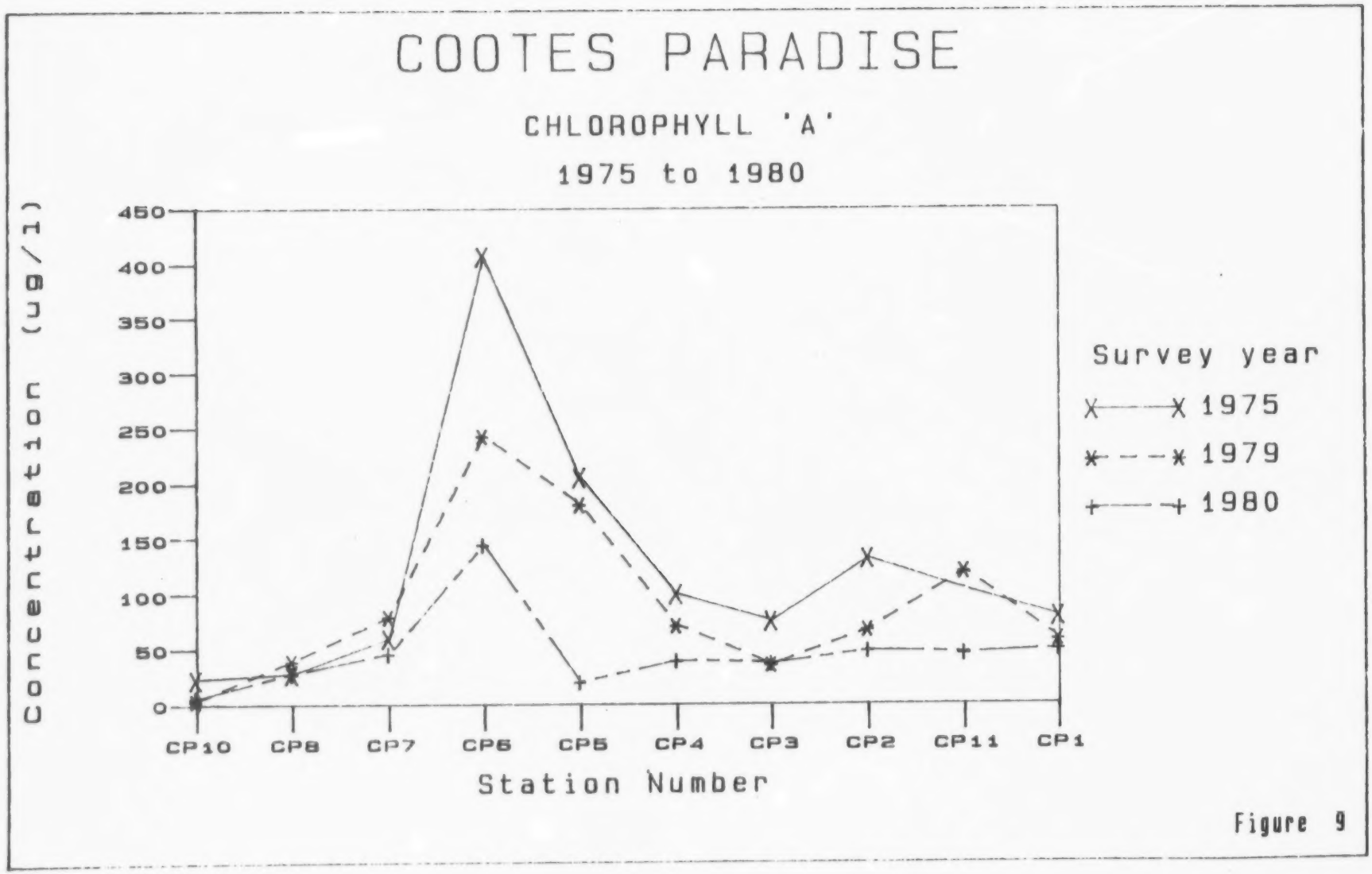

COOTES PARADISE
CHLOROPHYLL 'A'
1975 to 1980
Concentration (ug/l)
450
400
350
300
250
200
150
100
50
0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 9

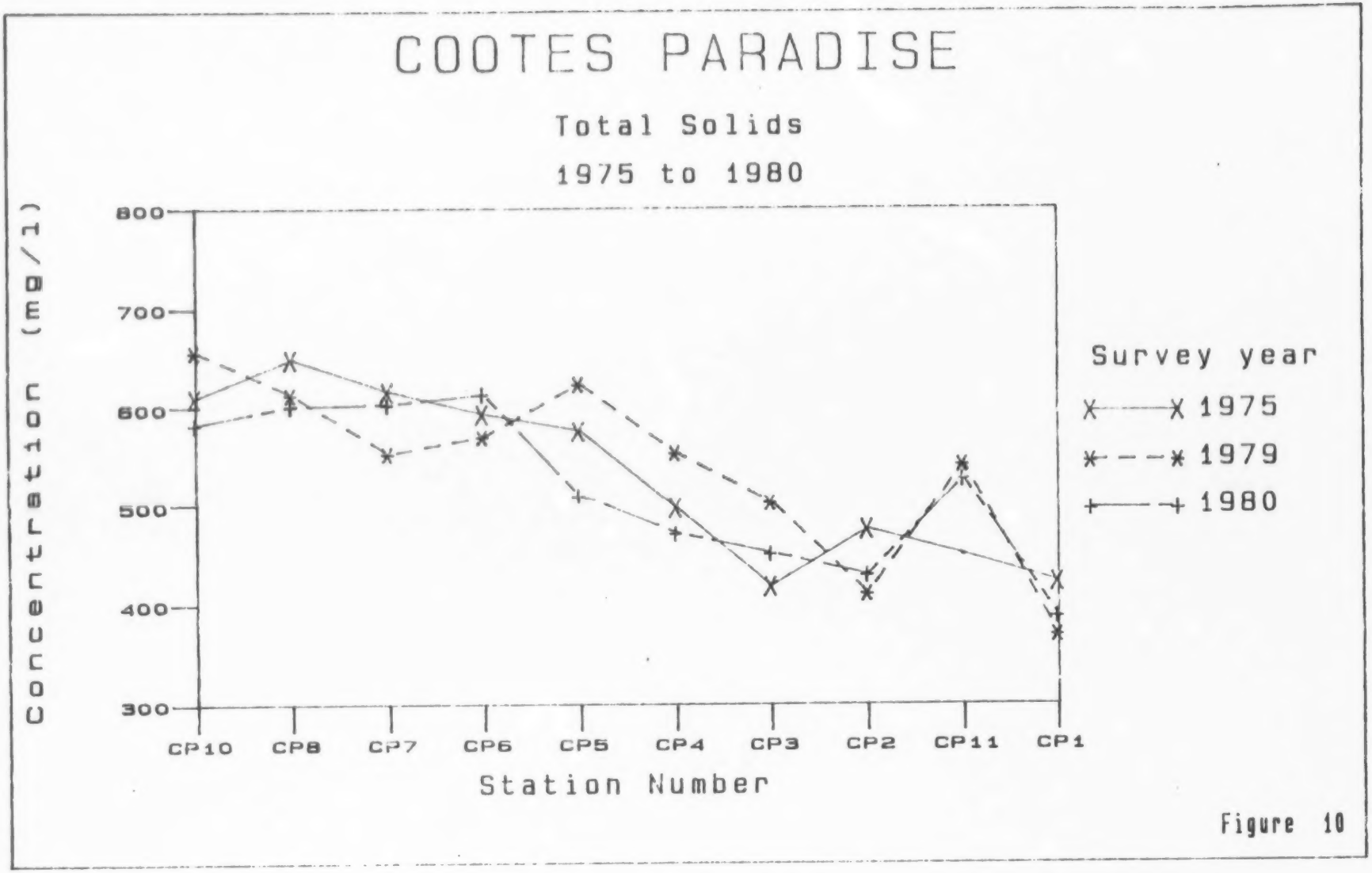

COOTES PARADISE
Total Solids
1975 to 1980
Concentration (mg/l)
800
700
600
500
400
300
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 10

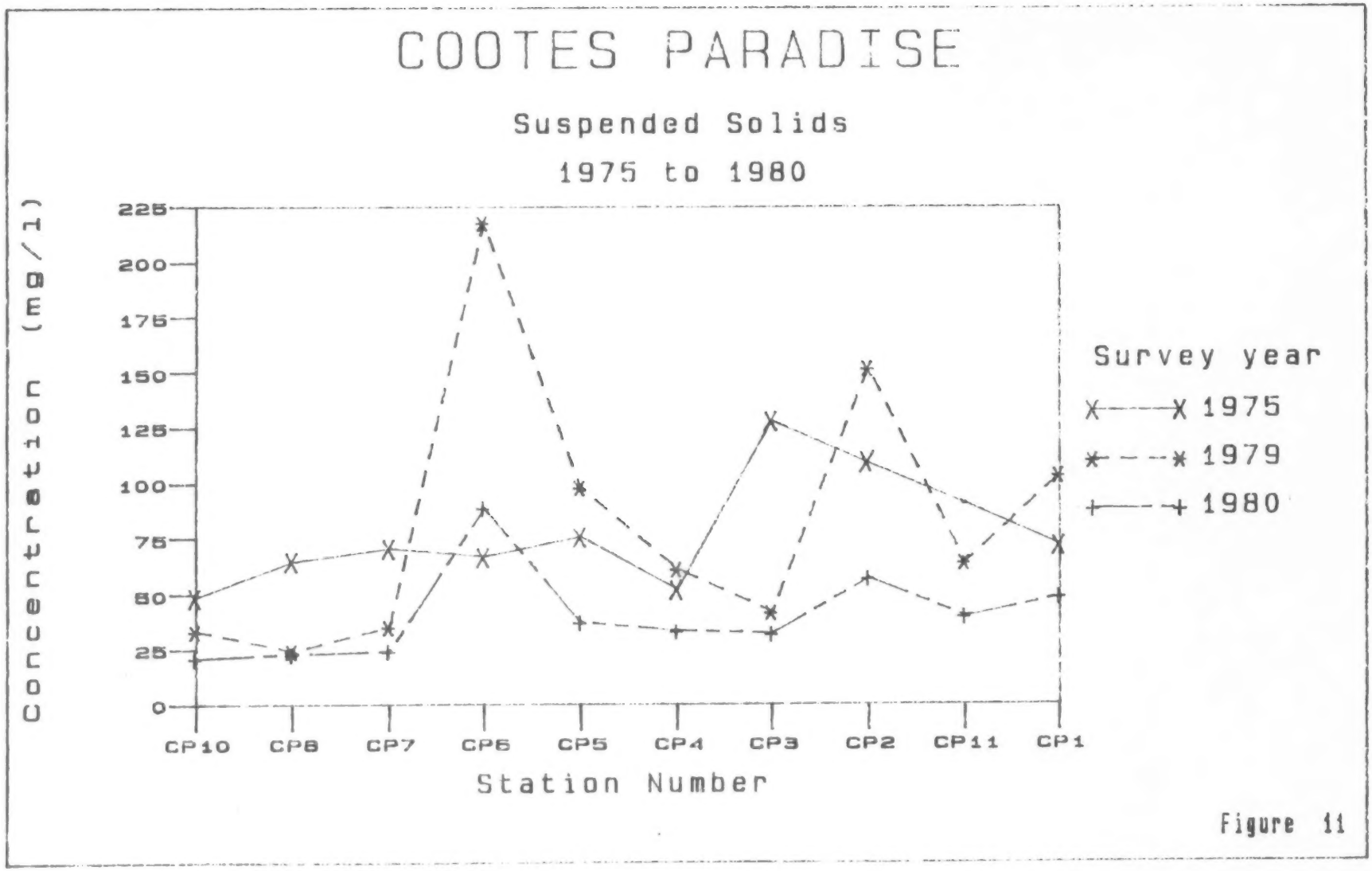

COOTES PARADISE
Suspended Solids
1975 to 1980
Concentration (mg/l)
225
200
175
150
125
100
75
50
25
0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1979
1980

Figure 11

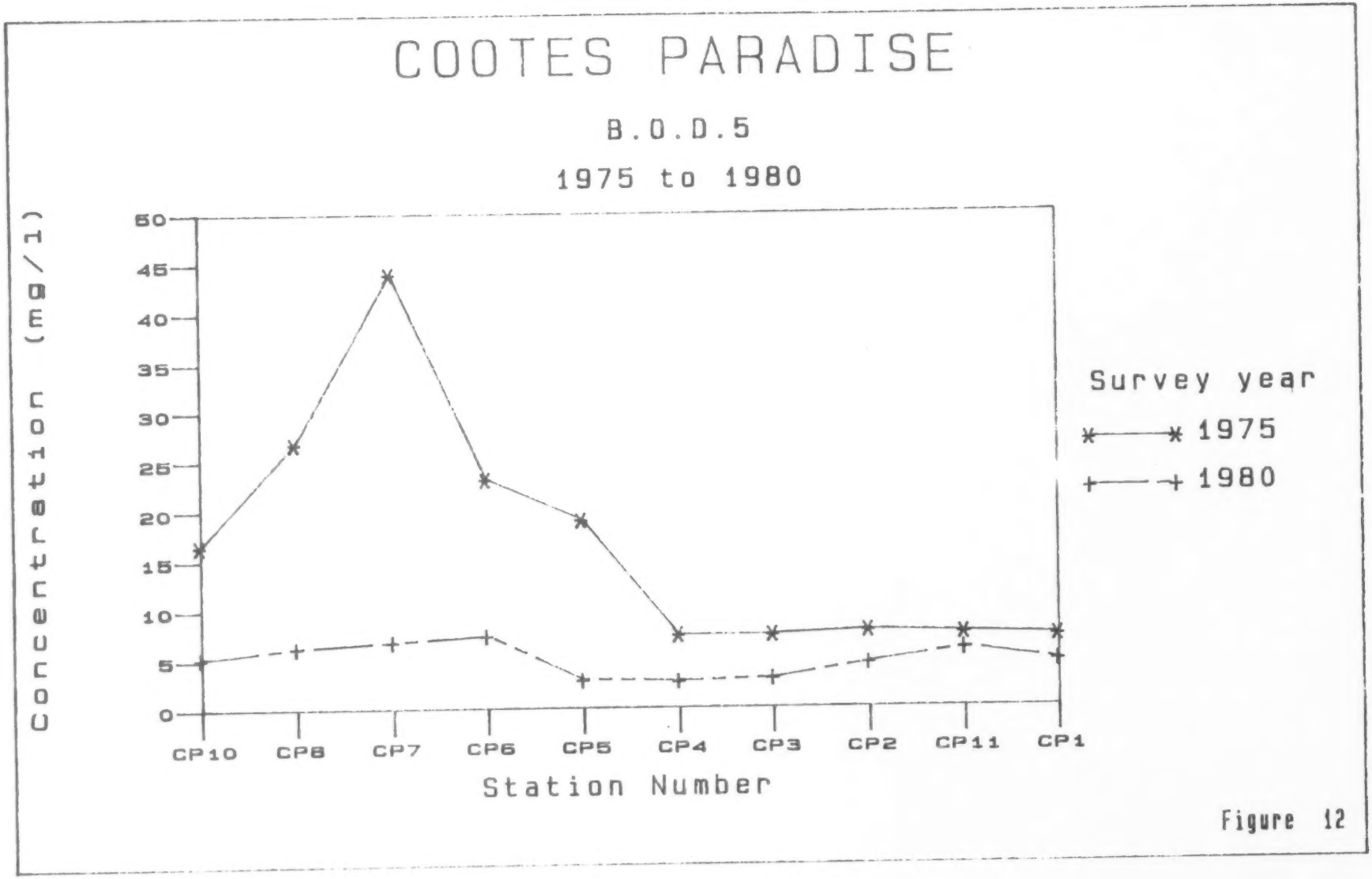

COOTES PARADISE
B.O.D.5
1975 to 1980
Concentration (mg/l)
60
45
40
35
30
25
20
15
10
5
0
CP10
CP8
CP7
CP6
CP5
CP4
CP3
CP2
CP11
CP1
Station Number
Survey year
1975
1980

Figure 12